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THE Philadelphia & Reading Railroad and Coal and Iron companies have passed out of the hands of the receiver, and the long, brilliant financial struggle of its president, FRANKLIN B. GOWEN, is at an end.

SENATOR JACOBS has introduced in the Senate of this State a bill in which he proposes, with a view to ending the existence of fictitious mining companies, organized under the laws of the State, that every company shall report its condition annually to the Superintendent of the Banking Department. This officer is to be empowered to investigate the condition of every company which he may consider unsound, and, if he finds it bankrupt, to authorize the Attorney-General to bring a suit for the abrogation of the charter.

A MOVEMENT has been started among the friends of the late FRIEDRICH WOEHLER, the great Göttingen chemist, to erect a monument, we presume in the university with which he was connected for so many years. With Heidelberg, Göttingen shared the preference of American students, many of whom will ever remember the famous instructor at whose feet they sat. American chemists, we trust, will heartily co-operate in offering this tribute to the memory of the famous scientist. So far as we know, no organization has been as yet perfected.

THE Grand Jury has fully recognized the great differences in plan and execution between the New York and American steam heating companies upon which we have always insisted. It exonerates the former company from all blame in connection with the nuisance which has for months aroused the indignation of the citizens of New York, and refrains from indicting the latter company only because it has promised to remedy its system. How far it will be possible to counteract the radical defects to which we have alluded in the past remains to be seen.

MR. PAUL JOHNSSON, in a communication printed elsewhere, suggests an improvement in copper smelting, which we believe is worthy of the careful consideration of metallurgists. We have had occasion to present at some length the methods of Mr. HOLLWAY, and later the modification of it by M. MANHÉS, and have had valuable expressions of opinion *pro* and *con* by experienced copper smelters in this country. Mr. JOHNSSON aims at the same object, but advocates the use of the open hearth in preference to the converter. There is much force in the argument presented in behalf of Mr. JOHNSSON'S plan, which, so far as we know, is new.

MR. EDWARD ASHMEAD has compiled a series of figures showing the amount of dividends paid by public mining companies formed in England, from which it appears that 26 British mines returned, on a called-up capital of £1,033,626, dividends amounting to £161,802 in 1882, making the total to date £3,319,131; while 26 foreign mines yielded, on an allotted capital of £9,656,007, profits of £1,334,822, carrying the total dividends up to £9,304,555. The heaviest amounts are to the credit of copper mines, the low-grade pyrites ores of the Peninsula leading. Rio Tinto has a record of £455,000; Tharsis, of £284,165; Mason & Barry, in Portugal, £231,455. These properties, however, are heavily capitalized, the figures for the three companies being respectively £3,250,000, £1,136,660, and £1,851,640, the aggregate returns thus far standing £882,500, £2,686,844, and £724,849. Among the other copper companies, Cape Copper, of the Cape of Good Hope, stands far ahead in productiveness, having yielded since 1863, on a capital of £160,000, dividends footing up to £978,125, the last one being £120,000. Of the Chilian mines, Copiapo distributed £26,152 this year, making the total since 1830, on a £166,425 capital, £119,228; while Planulcillo, which appears to be getting into good shape, gave its holders £25,000 last year, on an investment of £200,000. The three Spanish lead mines, Fortuna, Alamillos, and Linares, did not do much, the returns being only £3542, £2250, and £7293. Richmond Consolidated stands forth with £54,000 on £270,000 capital, the aggregate dividends being £754,517. The two leading California gold mines, Sierra Buttes and Plumas-Eureka, kept up their record with £15,312 and £35,156 dividends, making the total £256,735 and £295,311 respectively, on a capital of £245,000 and £281,250. Birdseye Creek paid £4500, in addition to £13,500 previously, on £60,000 capital. The old St. John del Rey, Brazil, yielded only 5 per cent, while its younger neighbor, the Santa Barbara, gave double that amount. None of the vaunted Indian mines makes any returns, and from present prospects will not figure prominently for years to come.

THE BOSTON MEETING.

The success of the Boston meeting needs no advertisement. It trumpets itself. The present generation recognizes it; and the record of it on our part would be superfluous but for posterity, which we profoundly pity, because, however often it may enjoy itself, even in Boston, it can never have precisely that good time which was granted to its ancestors at the February meeting of the Institute in 1883.

It should never be forgotten that, under all the social and professional pleasures of these reunions, the essential strength and prosperity of the Institute rests upon the *Transactions*. Out of some 1200 members, not more than 100 or 200 attend any meeting; and those who stay at home have nothing to show in return for their support of the Institute but the consciousness of virtue and the value of the papers which they receive. Now, the consciousness of virtue is a good thing, no doubt; but we prefer to rely on the value of the papers. It might easily occur, for instance, to the mind of a distant member, to obtain his consciousness of virtue by supporting some other good enterprise, such as an orphan asylum, instead of the Institute.

The abundance, variety, and interest of the *Transactions* hitherto has been admitted abroad as well as at home. The tenth volume, just published, presents in its 52 papers no exception to the rule. But there was some reason for apprehension as to Volume XI., because the Colorado meeting in August last took the place of the two meetings ordinarily held in May and October, and was, moreover, rather less fruitful than usual in papers. This, by the way, is a sufficient answer to those who occasionally rise to remark that the Institute meets too frequently, and that two meetings a year would be enough. The Council has, under the present rule, authority to postpone or omit any meeting except the annual one in February. But experience shows that the number of papers presented diminishes with the number of meetings; and while this continues to be the case, we do not doubt that, with obviously advisable exceptions, the Council will continue to call three meetings annually.

The Boston meeting has nobly made up the deficiency of papers for the

year, and we may now look forward with assured satisfaction to our next volume. Of the importance of the Boston papers, we need not speak at present. Perhaps the most important, practically, was that presented by Messrs. MAYNARD and BOWER, describing the BOWER-BARFF process for the preservative treatment of cast and wrought-iron surfaces. This can not be called an entirely new subject, since the process is in wide use in Great Britain and Europe, though it has but just been introduced here. But we do not remember any description of it so full, clear, and satisfactory as this paper contains. Of the commercial importance of the subject there can not be two opinions.

Another paper which we heartily welcome is that of Professor BLAKE, describing the American metallurgy of nickel, as developed by Mr. JOSEPH WHARTON, whose merits in this connection did not for years receive the praise they deserved, but are now generally recognized on both sides of the ocean.

The interesting excursions (more numerous and more agreeable than a Massachusetts February is wont to permit), and the graceful and bountiful hospitalities enjoyed by the Institute, have been already chronicled in our columns. As for the Subscription-Dinner, we may confidently say it was as successful as it could be—without HOLLEY. He it was who initiated the delightful practice, and, by a series of splendid successes, made it an unwritten custom, from which we are loth to depart, although, after each brilliant banquet, we say to ourselves that it were better to have no more than to run the risk of breaking the charm by one failure. He it was who delighted in all the burdensome preparations; who interviewed the caterer and the cook; settled the *menu* and the toasts; determined the invitations and the seating of the guests; and, after all these herculean labors, came to the feast the most *debonair*, witty, eloquent, and happy of the whole company. The committee-men who tried at Boston to manage these difficult details as HOLLEY would have done it had many an occasion to long for his inspiring and helpful presence.

The proceedings at these banquets are, as a rule, not reported. For this course, there are many good reasons, among them this: That the people who are present invariably tell such tales of the beauty and brilliancy of the occasion as should not be brought into contact with cold type. Moreover, the true after-dinner speech should be an elegant and ephemeral trifle. It is the one form of oratory left which is not addressed to that nuisance of modern times, "a wider audience." Preachers preach for the newspapers; lawyers plead for public effect; Congressmen address "the deestrict" over the Speaker's head: let the after-dinner orator at least talk to those who hear him, and no others. In this graceful art, the members of the Institute have won no little reputation. Once print their speeches, and we fear both the art and the reputation would be gone!

But an exception may be made now and then, especially in the case of verses, like those which we reprint elsewhere, and in which Mr. BAYLES, cleverly doing for *Iolanthe* what he once did for *The Pirates*, has given us a companion-piece to "The Modern Mining Engineer." When we add that he worked these verses into a speech on the memory of Washington and the Victories of Peace, we give a new hint of the flexible style and comprehensive scope of true post-prandial rhetoric.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes.]

The Question of Time in "Continuous" Pan Amalgamation.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The absolute minimum of water that can be used in crushing wet by stamps, without decreasing results, is very far below the almost universal notion entertained by mill-men. A rule of mine is, to regulate ten stamps to fill a five-foot pan forty inches deep in twenty-five minutes. This rule was observed at Harshaw, where we crushed five tons to the stamp.

It will be seen that, in amalgamating in six pans, the time for amalgamation will be two and a half hours; and every additional pan adds twenty-five minutes to this. When well regulated, a "continuous pan" has about one half as much sand in it as is ordinarily contained in a "charged pan;" hence there is one half of pulp particles and one half the amount of precious metal to be operated upon by a pan capacity, and an amount of quicksilver alike in both cases. M. P. BOSS.

TOTAL WRECK, ARIZ., Feb. 13.

The Geology and the Copper Deposits of Adams County, Pennsylvania.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My absence at the Boston meeting of the American Institute of Mining Engineers prevented me from noticing in your last issue the communication of Mr. J. Trowbridge Bailey in the number for February 17th. This latter is of a character to call for some comment. I do not propose to seek to elucidate the obscurities of some of his terms, such as, for instance, the apposition of "our Eastern sedimentary and primary formations;" the scope which he assigns to "the great Eastern mineral belt," etc.; but there are enough serious errors of fact in the body of the article to occupy all the space you may be disposed to give me.

The first of these, and one of the greatest, is found near the beginning of the part called "Geological Features" (of that portion of the South Mountain lying in Pennsylvania between Adams and York counties on the southeast, and Franklin and Cumberland counties on the northwest). Those of us who know this region are amazed to learn that "upon the west and north of the South Mountain in the Cumberland Valley we find a hard, compact, crystalline limestone lying *in a comparatively undisturbed state* . . . between two upheavals, namely, the South Mountain and the North Mountain." It is quite clear that no one familiar with Prof. H. D. Rogers's sections V., VI., VII., VIII., and IX., published with his final report over twenty-six years ago; or with the descriptions and sections of the present survey; or with the many papers on the subjects connected with the "Great" or "Cumberland Valley;" or, finally, with the valley itself, could employ such an expression to describe the structure of its limestone. Not only is the limestone throughout its entire extent in Franklin and Cumberland plicated in the most confusing manner, but it is in all probability divided longitudinally into two parts which represent entirely different horizons in the Lower Silurian. Nor can any but the merest fragmentary areas of limestone (very likely belonging to an older system than that of the great valley) be called hard or crystalline; nor are the mountains between which the valley limestone lies at all likely to be mountains of upheaval.

We learn that the underlying crystalline schists . . . . have been greatly dislocated and turned upward by the disturbances caused by the formation of the South Mountain," etc.; and "except where infiltration has taken place, the stratified formations are devoid of copper-bearing minerals." A "quartzitic epidote" is described as "breaking through the stratified formation;" for which misdemeanor it is called a "dike" and a "volcanic intruder." "Present in all directions, and *highly metamorphosed*, are amphibole, chlorite, and the many decomposition products of epidote." It may assist in the assimilation of the above wealth of geological description to pause and inquire whether a basic mineral like epidote can be justly called quartzitic; whether a quartzitic epidote, or, in fact, any other kind of epidote, was ever observed as a volcanic intruder; what is the present state of metamorphosed amphibole and chlorite and "the manifold decomposition products of epidote;" also, whether here, as elsewhere, the epidote be not itself a decomposition product. Farther on, we are impelled to ask what kind of metamorphosis is that due to serpentine, and how this mineral is supposed to have "broken through" the schistose or sedimentary "strata." While on this subject, and neglecting much more original matter in the same strain, it would be advantageous to know what are the characteristics of a "mineralized epidote or serpentine zone."

The region is remarkable for producing pieces of native metal weighing 27 pounds. If the writer's memory may be trusted, this was the precise weight of a hand specimen which was given to him to examine six years ago. He was unable to discover another piece of this size; and though there were found near the contact-planes of the epidotic rock and the orthofelsite many places where the rocks were filled with minute spangles of native copper, a number of analyses showed that the percentage of this copper to the mass was about 3·6 (3·36 per cent reckoned as pure copper), while the copper in combination varied from 4·35 to 4·7 per cent. On this account, it does not accurately describe the ore to speak of it as "exceptionally rich." Of course, the writer speaks of what was visible three years and more ago, and in no wise refers to developments which may have been made since. If there be such, it would be interesting to know them.

Before leaving the geological for the bibliographical treasures of this essay, it is worth while to quote one more paragraph: "The vein-matter is composed of a metamorphosed quartzitic chlorite . . without affording at the point of contact" (with the walls) "any signs of clayey decomposition or other features so characteristic of fissures. It presents *all the appearance of being a fault or slip* in the country chlorite." The problem here is, how could a fault or slip exist without a fissure? and how could vein-matter be a fault or slip?

As to the bibliography, this very refreshing sentence comprises it all. "Although the locality has been frequently the subject of reports by a number of engineers, other than a mere casual reference has never been made to these geological characteristics."

Interpreting this language literally, it is quite true; and it would not be too hazardous to prophesy that no engineer, if he have a small foundation of geological theory and practice, is likely in the future to make other than a casual reference to the geological characteristics of which the preceding quotations are examples. But this is quite clearly not what Mr. Bailey means to say. He supposes that no one has properly noticed the structural and litho'ogical geology of this region but himself. In this, it is quite easy to prove to him that he is mistaken.

In 1876, Dr. T. Sterry Hunt (after spending some weeks in 1875 with the writer in this region) published his views of these rocks. The writer's two volumes C and CC, containing the reports of progress for 1874 and 1875, treat of the relations of the series of rocks involved in the phenomena of the copper belt. In 1877, the writer printed in the *Polytechnic Review* (April 21st and 28th), an article on the Copper Ores of Pennsylvania, in which special prominence is given to the geology of this region. In 1878, Dr. Hunt published Report E, containing his views on the origin and genesis of these horizons of the South Mountain chain *in extenso*. At the Baltimore meeting of the American Institute of Mining Engineers, February, 1879, Mr. Blandy presented a paper on this region, which was discussed by Dr. Hunt and the writer, especially in its geological features. [Transactions of the American Institute of Mining Engineers, Vol. VII., p. 337.] Finally, in Volume CCC, Second Geological Survey of Pennsylvania, 1880, Appendixes 1 and 2 are chiefly given up to the study of this very region. It is true that all of us who have toiled along in darkness as best we might before the advent of Mr. Bailey may be quite wrong; but if we "don't know," we at least should be accorded the meed of justice that Dick Deadeye allows the Admiral in *Pinafore*—we "mean well," and really ought not to be so cruelly neglected; for it is not every one who can approach a difficult geological problem like that of the copper region of Adams County with a mind as freed from the prejudice due to numerous and conflicting previous experiences as is that of Mr. Bailey.

PERSIFOR FRAZER.

THE BOSTON MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

THE FIFTH SESSION.

The final session of the Institute was held on the morning of Friday, the secretary submitting a report showing that the finances of the Institute were in a flourishing condition, and that its membership had been increased to 1213. The election of officers was announced as follows: *President*—Robert W. Hunt, Troy, N. Y. *Vice-Presidents*—S. F. Emmons, Denver, Colo.; W. C. Kerr, Washington, D. C.; S. F. Wellman, Cleveland, O. *Managers*—John Birkinbine, Philadelphia, Pa.; Stuart M. Buck, Coalburg, West Va.; E. S. Moffatt, Scranton, Pa. *Treasurer*—Theodore D. Rand, Philadelphia, Pa. *Secretary*—Thomas M. Drown, Easton, Pa.

Professor Dr. Persifor Frazer then read an elaborate paper entitled the Eozoic and Lower Paleozoic in South Wales, and their Comparison with the Appalachian Analogues. As many members desired to leave by an early train, the time at Professor Dr. Persifor Frazer's disposal was necessarily limited. Dr. T. Sterry Hunt, however, as briefly as possible outlined the points which led him to accept opinions contrary to those of Mr. Frazer, but necessarily justice was not done to the subject under the circumstances.

After the transaction of routine business, the meeting adjourned. Later, a party of about sixty members of the Institute took a train courteously furnished by the Boston & Lowell Railroad, and under the guidance of Professor Richards and Messrs. Eustis and Leavitt, went to Lowell, where they were received by Mr. J. B. Francis, by whose invitation the visit was made. He took charge of the excursionists, conducting them in carriages to his residence, where lunch was served. Mr. Francis, the foremost of living American hydraulic engineers, planned the present elaborate system of utilizing the water-power at Lowell, and is conspicuously identified with similar work in other sections of the country. The Lawrence, Lowell carpet, and Merrimac mills, together with the water-power; dam, and canals, were in turn visited, and, returning to Boston, the party scattered to their homes.

SAID I TO MYSELF.

Lines read by Mr. J. C. BAYLES at the Subscription-Dinner, given by members of the American Institute of Mining Engineers at the Hotel Brunswick, Boston, February 22d, 1883.

When I was a nascent professional man,
Said I to myself, said I,
An Institute member I'll be if I can,
Said I to myself, said I.
For membership there is an honor indeed;
To the meetings I'll go with long papers to read,
And I'll do what I can when it comes to a feed.
Said I to myself, said I.

I'll never throw dust in a stockholder's eyes,
Said I to myself, said I;
Nor hoodwink an expert who's not overwise,
Said I to myself, said I.
If I'm working a mine and the ore "peters out."
Or its future is somewhat a matter of doubt,
I'll tell every body they'd better keep out,
Said I to myself, said I.

If I'm running a blast-furnace, little or big,
Said I to myself, said I,
I'll not count my cinder as Bessemer pig,
Said I to myself, said I.
My worthy profession I'll never disgrace,
By claiming of phosphorus only a trace,
When analysis shows that it isn't the case,
Said I to myself, said I.

If I work as a chemist in iron and steel,
Said I to myself, said I,
I'll never deceive, by a very great deal,
Said I to myself, said I.
I won't say that silicon vainly I've sought;
That sulphur, if present, declines to be caught,
Nor put down for manganese decimal naught.
Said I to myself, said I.

If as a geologist fortune I seek,
Said I to myself, said I,
I'll try to avoid being bashful and meek,
Said I to myself, said I;
For many geologists fail of success
Because they lack courage their views to confess,
And fear to offend if their thoughts they express,
Said I to myself, said I.

If some well-endowed college of science and art,
Said I to myself, said I,
As a learned professor should give me a start,
Said I to myself, said I,
I'll try to know something of what I'm to do;
I'll read up on subjects relating thereto,
And besides teaching science, I'll study it, too,
Said I to myself, said I.

In other professions in which men succeed,
Said I to myself, said I,
Of "cheek" and assurance they often have need,
Said I to myself, said I.
Professional modesty's pushed to excess;
The value of confidence all must confess,
And even E. Ms. need a little, I guess,
Said I to myself, said I.

COAL AND IRON IN ALABAMA.*

By T. Sterry Hunt, LL.D., F.R.S.

Coal was mined to a small extent near Tuscaloosa in Alabama, and even carried by boats to Mobile, half a century since. Professor Porter, and later Prof. R. T. Brumby, occupied themselves with the geology of the region, and it attracted the attention of Sir Charles Lyell, who visited the region. It is, however, to the two reports of Professor Tuomey, Geologist to the State, published in 1850 and 1858, that we owe our first clear notions of the geology of the Alabama coal-field. His work has since 1873 been continued by Prof. Eugene A. Smith, of the University of Alabama, whose valuable reports, extending and completing the work of his predecessor, are indispensable guides to the geological inquirer in this region. Mention should also be made of the investigations of Mr. R. P. Rothwell, who, after three years of studies in parts of the Alabama coal-fields, read before the American Institute of Mining Engineers in October, 1873,† a brief but important paper calling attention to the great deposits of coal and iron ore found therein, and their economic importance. Having myself during the past year had an opportunity of visiting parts of this region, I have thought that it might be well to bring before the Institute some facts and considerations as to its geological and geographical characteristics and the value of its mineral resources.

It is well known that the great Appalachian coal-basin, stretching southwestward through Eastern Tennessee and the northwestern corner of Georgia, terminates in Northern Alabama in what is called the Warrior coal-field, which there covers an area of about 5000 square miles. Lying along the southeast border of this, but separated by a narrow belt of older rocks, is the Cahaba coal-field, having an area of about 230 square miles; while to the northeast of this, and near it, is the Coosa field, a still smaller and little known area covering about 100 square miles. These smaller fields were evidently at one time continuous with the greater one to the west, and belong to the great Appalachian basin, from which they have been separated by folding, faulting, and erosion. They are narrow and elongated in a northeast and southwest direction.

Along the southeastern border of these coal-fields in Alabama extends a broad valley drained by the Coosa River, of which it bears the name. This is the southwestern extremity of the great Appalachian Valley, which stretches continuously from the Hudson, through Pennsylvania, Virginia, Tennessee, and Georgia. The ancient crystalline rocks of the Atlantic belt—seen in New England, the Highlands of the Hudson, the South Mountain of Pennsylvania, and the Blue Ridge—which form the southeastern border of the great valley, are still found in their place limiting the Coosa Valley until we reach the center of Alabama. The northwestern border of this valley is here defined by the eastern edges of the Coosa, Cahaba, and Warrior coal-fields, and appears in Lookout Mountain, near Chattanooga. The valley thus limited has a breadth varying from fifteen to thirty miles or more, and is furrowed by many subordinate parallel ridges.

In Central Alabama, the crystalline rocks on the one side and the coal measures on the other alike sink down and disappear beneath the transverse belt of quaternary deposits known as the Port Hudson group, which conceals the contact between the older rocks and the overlying Cretaceous strata lying to the southward.

It is instructive to one acquainted with the great geognostical and geographical divisions of the Middle States to follow these southward till they are lost in the manner just described beneath the broad plain of the Gulf States. The great Appalachian coal-basin in Pennsylvania, Ohio, West Virginia, and Kentucky is, as is well known, tributary to the Ohio, through which its waters pass by the Mississippi into the Gulf of Mexico. It has for this reason been not inappropriately called the Ohio coal-basin. Along its eastern border stretches the double mountain-line of the Alleghanies and the Blue Ridge or Atlantic belt, which separate the coal and iron from the tidal waters of the Atlantic coast. But in Alabama, we reach the southern extremity of these mountain ranges; we find the barrier broken down, and the southern part of the vast Ohio basin drained by navigable rivers flowing through a great plain to the Gulf of Mexico.

The detached coal-fields along the eastern border of the great basin, which are seen from Pennsylvania to Alabama, are often designated as outliers, and Professor Smith has aptly described the valleys with lower rocks, limiting these subordinate coal-fields, as outliers of the Coosa Valley. These, which have the northeast and southwest direction of the latter, are, first, the Cahaba Valley, separating the Coosa and Cahaba fields; and second, the Long Valley, as it is called, which separates the Cahabas from the Warrior field, and extends from below Tuscaloosa northward to Village Springs, beyond which it bifurcates, the western branch running to Sand Mountain, which terminates the valley, and the other running northeast into Georgia and Tennessee.

It is along this valley that the Alabama Great Southern Railroad passes from Chattanooga to Birmingham, and thence nearly to the southwestern end of the valley, where the railroad turns westward to Tuscaloosa, at the southeastern extremity of the Warrior coal-field. It will further aid us in forming a notion of the geography of this region if we bear in mind that the Selma, Rome & Dalton Railroad, nearly parallel with the last, runs, from the crossing of the Coosa River, northward within the Coosa Valley, and from eight to ten miles to the westward of the crystalline range which forms the eastern boundary of this valley.

There remains to be noticed a third outlying valley farther west than those already mentioned, and known as Brown's Valley. This, which is a prolongation of the great Sequatchee Valley of Tennessee, does not extend far southward, but dies out at Blount's Springs, in the Warrior coal-field. The uplift connected with this anticlinal valley, however, continues southward, and affects the strata of the coal-field.

The rocks of the region before us may, for the purposes of our present inquiry, be conveniently considered in four divisions, which are as follows, in ascending order:

I. The ancient crystalline rocks of the Atlantic belt along the southeast side of the Coosa Valley, containing occasional deposits of magnetic iron ore.

II. The various subdivisions between these and the base of the Chazy

* Read at the Boston Meeting of the American Institute of Mining Engineers.
† Transactions American Institute of Mining Engineers, Vol. II., pp. 144-157.

limestone, included by Smith under the heads of the Ocoee slates and conglomerates, the Chilhowee sandstones, and the rocks of the Knox group, in which latter slate and limestone predominate and are associated with great deposits of limonite and of oxide of manganese. These rocks appear in the Coosa and the outlying valleys.

III. The rocks lying between the last and the base of the coal measures, including representatives of the Chazy and Trenton limestones, the Nashville or Cincinnati group; the succeeding Silurian, represented chiefly by the Clinton group, with its great beds of red hematite or fossil ore; a small thickness of black shale, representing the Devonian; and a considerable mass of strata, chiefly limestones, belonging to the Lower Carboniferous.

IV. The Coal Measures.—Of the first or crystalline division it is not necessary here to speak, except to say that it consists for the most part probably of rocks of Montalban age, as I have shown to be the case in the continuation of the same belt farther to the northeast in Georgia. Elsewhere, as in North Carolina, they are underlain by Laurentian gneisses, which here include the magnetites of Roan Mountain. Magnetic and specular ores of iron are, however, found in all the great subdivisions of the Eozoic rocks. A deposit of the former is said to be found in Clay County, Alabama.

As regards the second division, which is economically important from the presence of great deposits of brown hematite or hydrous iron ore (limonite, etc.), as well as manganese ore—various geological questions arise which can only be mentioned here. The same ore-bearing belt is traced continuously with constant characters from the Coosa throughout the Appalachian Valley, and is the Primal and Auroral of Rogers and the Lower Taconic of Emmons. It is quite distinct from the series called Upper Taconic by the latter, which is the Quebec group of Logan, although the two were for a time confounded. Safford, in Tennessee, gave the name of the Knox group to the older or Lower Taconic series, with which he included some limestones occasionally found in the valley of East Tennessee, containing a fauna which belongs to the horizon of the Calciferous and thus represents the so-called Quebec group. Professor Smith, following Dana, has, in his classification of the rocks of Alabama, described as belonging to the Quebec group the whole of the Knox group or Lower Taconic, measuring in East Tennessee, according to Safford, not less than 7000 feet, and consisting of sandstones with shales and limestones, including limonite. The Chilhowee sandstones and Ocoee shales and conglomerates, which occur chiefly as ridges in the Coosa Valley, and which are, in part at least, probably older than the Knox group, and correspond to the lower part of the Primal of Rogers, are by Smith referred to the Acadian and Potsdam epochs of Dana. At the summit of the Knox group in Alabama, as in Tennessee, is found a fossiliferous limestone with *Maclurea*, marking the Chazy subdivision, to which succeeds the Trenton limestone. Inasmuch as there is reason to conclude, from many observations elsewhere, that there is at this horizon a great stratigraphical break separating the limonite-bearing rocks from those above them, I have placed the Chazy with the Trenton in the third division.

The rocks included in this third division embrace representatives of all the great groups of Paleozoic rocks from the Chazy to the base of the coal measures; Ordovian (Lower Silurian or Siluro-Cambrian); Silurian (Upper Silurian); Devonian or Erian; and Lower Carboniferous. The united thickness of all these is, however, very small when compared with that of the same groups farther north in the same great Paleozoic basin. In Pennsylvania, if we take Ashburner's measured section in Huntingdon County, we have, from the base of the coal measures to the summit of the Trenton, not less than 17,640 feet, making, with the addition of the latter, more than 18,000 feet. With this measurement, other sections in the same succession in Pennsylvania agree pretty closely. It is unnecessary to recall the fact that this great thickness of rocks consists in large part of sandstones and other coarse mechanical sediments, the foldings of which give rise to the belt of mountainous country separating, in Pennsylvania and Virginia, the coal measures from the iron-bearing rocks of the great valley and its outlets.

Prominent among the ridges of the Alleghany Mountain region are those of the Oneida sandstone, the first or lowest in the intervening series of these great masses, with a thickness of 2000 feet or more, which forms what is called the North Mountain along the northwest side of the great valley, and is repeated by anticlinal folds farther west. Directly overlying this sandstone is the Clinton or red fossil ore, which extends continuously from New York to Alabama.

If now we turn from Pennsylvania to Alabama, we find that this great series of strata, which we have included in our third division, is reduced in thickness from 18,000 feet to 1000 or in places 1600 feet, consisting moreover, in great part of soft and calcareous rocks. As a result of this, the limonites, the fossil ore, and the coal, instead of being separated from each other by great belts of mountain-forming strata, are brought side by side in a comparatively level country, and are thus presented under conditions extraordinarily favorable for mining, manufacturing, and transportation.

The coal measures themselves, which constitute our fourth division, have suffered no apparent diminution in thickness. They are estimated in round numbers at 3000 feet in Pennsylvania, and are probably not less in Alabama, where one section, hereafter to be noticed, measures, according to Professor Smith, not less than 2600 feet.

The outlying valleys already mentioned are eroded anticlinals, often accompanied with dislocations of the strata, and in them are exposed the fossil ores and still lower limonites. The Long Valley, which extends from below Tuscaloosa by Birmingham northward, and in its lower and middle portions is known as Roup's and Jones's valleys, respectively, divides, as we have seen, the Warrior coal-field from the Cahaba outlier on the east, the distance between the two coal-fields being rarely over six or eight miles. In the upper part of the course of this anticlinal uplift, the strata of the third division are seen dipping regularly beneath the coal measures on each side; but toward the southwest, the beds have been sharply folded and pushed over to the northwest side, producing a real inversion, so that all the strata appear dipping to the southeast. The Lower Carboniferous limestones on the western side of the valley thus lie below the Chazy and Trenton limestones, and these again below the still older rocks of the Knox group, the whole series being overturned and folded upon itself. The structure is further complicated in parts by faults, bringing up, on the east side, the older rocks against the Lower Carboniferous limestones.

As a consequence of these accidents, so well described by Professor Smith, some of the beds are in part concealed, and others are duplicated. Conspicuous among these are cherty ridges belonging to the second division and associated with the limonites. Still more marked are the rocks of the Clinton group, known in Tennessee as the Dyestone and in Alabama as the Red Mountain group, from the beds of red hematite or fossil ore seen everywhere seen along its outcrop.

A remarkable dislocation of the strata occurs to the southeast of the Cahaba field, where white limestones of the Knox or Taconic series are brought, by a great upthrow, on a level with the highest of the coal measures, here sharply cut off and upturned. This great fault was estimated by Rothwell at not less than 10,000 feet, and his interpretation of the structure, though questioned at the time, has since been confirmed by the observations of Professor Smith and myself.

To the northward, where the coal measures still cover the anticlinal arch which divides the Cahaba from the Warrior field, it rises into a ridge or hill; but farther southward, where denudation has done its work in removing the higher strata, the eroded valley is bordered on each side by a rim of the basal sandstones of the coal measures, the tilted edges of which are still higher than the undisturbed beds of the coal-fields on each side. The result of this is the singular one that the waters of the valley break through the ridges on each side, and find their way into the Cahaba and Warrior rivers, the valley being really higher than the plains on each side of it. As a consequence of this peculiar drainage, we find that the limonite ores along the valley, instead of being buried in clay, as elsewhere is usually the case, are often laid bare, and form hillocks and ridges scarcely covered with soil.

The Warrior coal-field is divided by Smith into the plateau or table-land region on the north and the Warrior basin proper lying to the south. The southward extension of the anticlinal, which in its eroded portion farther north gives rise to Brown's Valley, traverses the field as a low ridge, and divides the basin into two unequal troughs. Of these, the one to the eastward—which is the narrowest, and is drained by the Locust Fork or Little Warrior River—is the best known, lying as it does between the anticlinal just mentioned and that of Long Valley. A section between this valley and Locust Fork, described in detail by Professor Smith in his report for 1877–78, shows above the Lower Carboniferous limestone about 2600 feet of coal measures, including a conglomerate at the base. This, from its proximity to the valley and to the railroad, is the part of the field which has been best explored, There are found in this section twelve seams of coal of from two and a half to seven feet, and having an aggregate thickness of fifty feet. Of these, five seams have been extensively mined. The strata are nearly horizontal and affected only by slight undulations. The Pratt seam—the highest in the section—which is now extensively mined about six miles west from Birmingham, yields four and a half feet of coal, with one shale parting. As mined at the time of my visit in February, 1882, from two stopes and a shaft of 250 feet deep, it was yielding from 1200 to 1500 tons of coal daily, a considerable portion of which was coked at the mines. According to more recently published statements, the production at the Pratt mine has since been much increased. Several other productive mines are opened in adjacent parts of the same field.

To the west of the division just described, the development of coal in the region drained by the Big Warrior River is not less considerable, the later surveys of Smith and others showing the existence of many excellent seams of good quality, measuring from three to six feet in thickness.

In its southern part, where the Cahaba field attains its maximum breadth of twelve miles, the measures are regular, and have a dip of from six to ten degrees along the western border, gradually increasing to twelve or fifteen degrees near Lily Shoals, on the river, and to forty-five degrees or more near to its eastern edge, where the strata along the great fault are sometimes nearly vertical. Farther northward, about thirty miles from its southern extremity, where the Cahaba field is reduced to a breadth of six miles, the strata are somewhat crushed, and the upper measures, which appear farther south, near Monte Vallo, are wanting. The field is here crossed obliquely by the Alabama North and South Railroad, along the line of which, according to Rothwell, are found nine workable beds of coal, measuring from two to four feet in thickness, and giving an aggregate of over twenty-eight feet. In the wider and less disturbed parts of the field, farther south, the coal seams are thicker. On Four-Mile Creek, the same observer found eight seams with an aggregate thickness of thirty-eight feet, besides four higher seams in the Monte Vallo beds, equal to twelve feet. Along the eastern border of the field, however, the lower coals will be too deep for profitable mining.

Besides the analyses of coals from this field given by Rothwell, an extended table of analyses of others from the Warrior basin is given by Smith in his report for 1879–1880, and it may be said, in general terms, that the coals from both these fields are equal to those from the more northern portions of the Appalachian basin. They present the usual varieties in quality and composition, some of them being dry-burning coals, others coking coals, with as much as 65 per cent of carbon, while others contain much more volatile matter.

The iron ores of the region, as already mentioned, belong to two classes, the red hematite or so-called fossil ore of the Clinton beds, and the brown hematite below. The former is almost everywhere in its place at the outcrop of the rocks of the third division throughout the Long Valley. The ore has been traced, according to Professor Smith, with very little interruption, from Pratt's Ferry, on the Cahaba above Centerville, nearly to the Georgia line, sometimes very pure, and at other times too siliceous for use. Near Birmingham, where it is mined for the Oxmoor furnace, there are seen in a thickness of thirty feet twenty-five feet of ore with interposed shaly bands. Numerous analyses of the ore mined at different points in the valley, where their thickness is from ten to twenty feet, give from 42 to 55 per cent. They are generally smelted with an admixture of the brown hematite of the region.

As regards these brown hematites, I can only say, after comparing them with similar deposits of these ores from Massachusetts southward to Virginia along the great valley, that they are of wonderful extent and richness, and, so far as my observations go, are unsurpassed. These hydrous ores have been generated, as has been shown by myself and

others, by the alteration *in situ* of interstratified masses and layers, in some cases of carbonate of iron and in others of pyrites, included in the more or less argillaceous strata now changed to clays.* As already explained, the washing away of a great portion of these clays, where they are exposed along the lines of uplift, has left behind a correspondingly large amount of their included ore. From this, it results that over many square miles along the outcrop of these lower rocks, both in the west and east sides of the Cahaba coal-field, we find a succession of hillocks composed in great part of masses or fragments of brown hematite; while in their vicinity, excavations show the same ore still imbedded in the stratified and often highly inclined clayey beds resulting from the decay of the original rocks. In some cases, the same ore, of unusual purity, is found imbedded in large irregular masses in a quartzoze rock which belongs to the same geological series as the slates. It appears, from numerous analyses of these ores, that they are sometimes less hydrated than limonite and approach to turgite in composition. They have long been mined and smelted with charcoal along the Coosa Valley, where they are not less extensively developed than in the outlying valley west of the Cahaba field, in which district they are now mined for the furnaces of Birmingham and its vicinity.

It would be foreign to my present plan to enter into details as to any particular portion of the region before us. Its value as a whole consists in the fact that it possesses coal abundant in quantity, excellent in quality, and situated in proximity to the waters of the Gulf of Mexico, with which it can be readily connected by improvements of the rivers draining the coal-fields. From Tuscaloosa, which is on the southeastern edge of the Warrior field, there is navigation throughout the year to Mobile, a distance of 355 miles. As appears from a report of U. S. Engineers to the War Department, submitted to Congress in 1880, there is between Tuscaloosa and Sipsey Fork, in the Warrior basin, in a distance of 92¼ miles, a rise of about 16 feet. A system of dams and locks, with chambers 145×30 feet, would suffice to establish water communication from this point, in the heart of the coal-field, to Mobile throughout the year, for an estimated cost of $400,000. Barges laden with cotton, coal, and lumber have, it is said, for many years been sent down this way during seasons of high water.

The Alabama River is navigable from Selma to Mobile, and the Cahaba River, which drains the Cahaba field and falls into the Alabama a little above Selma, can in like manner, according to official report, be made navigable at a cost of $500,000.

The present lines of railroad have done little for the development of this mineral region. Two great north and south lines, as already pointed out, the Alabama & Chattanooga Railroad and the Selma, Rome & Dalton Railroad, pass down the valleys west and east of the Cahaba field. The South & North Alabama Railroad, however, a continuation of the Louisville & Nashville Railroad, which in its course from Decatur to Montgomery intersects the first of these roads at Birmingham, and the second at Calera, crosses a small part of the Warrior field near Birmngham, and also the narrow portion of the Cahaba field. The Georgia Pacific from Atlanta, passing through Birmingham, will traverse the breadth of the Warrior field. During the last years of the civil war, a line was surveyed and in part graded for the purpose of opening the lower part of the Cahaba field, starting from Ashley, a little below Calera, and running northwest and then northeast into the heart of the coal-field. It has lately been proposed to complete this work, and other projects are under consideration for the development of the Cahaba field, where very little has been done since the close of the war, during which coal was here extensively mined. My own observations at the old openings satisfied me of the correctness of Rothwell's observations, and showed that we have in this field a region which, as regards the supply of coal, the proximity of iron ore, and facilities for mining, smelting, and transportation, are unsurpassed.

As regards the iron resources of the region, we may note, in the first place, the proximity of the ore to the coal. With the limited exception of deposits of ore in the coal measures in the northwestern portions of the great basin, it is well known that the ore and coal in the United States are generally widely separated. Not to speak of the crystalline ores of the older rocks, the great supplies of limonite upon which the iron industry of Pennsylvania and Virginia are largely based present similar conditions. It suffices to look at a geological map of these States to see what a broad belt of mountainous country separates the limonite-bearing rocks of the great valley from the coal measures, while a very considerable interval also divides these from the fossil ores. Owing, as already explained, to the thinning out of the intervening rocks, which are reduced to less than one tenth of their thickness, and to the fact that those that persist are, for the most part, soft and crumbling, we have seen how the ores and coal so widely separated elsewhere are in Alabama brought into close proximity. Thus, in Long Valley, a distance of six or eight miles only separates the coal-fields from each other, while abundant deposits both of the red and the brown hematite are found in the interval between them. It is not therefore surprising that this valley is rapidly becoming an important center of iron production, where coke-made iron can be produced more cheaply than anywhere else on this continent.

The remarkable dislocation and upthrow, already noticed as occurring on the southeast side of the Cahaba field, bring about a still closer approximation of iron-producing materials by lifting up the lower ore-bearing rocks side by side with the coal measures. Here, on the banks of the Cahaba River, deposits of limonite of great abundance and purity are found extending over many hundreds of acres of the surface within two miles of opened beds of coking coal, while cliffs of a pure white limestone, well fitted for flux, are seen within the same distance. It is impossible to look upon all the developments of coal and rich iron ores, elsewhere so widely separated and here brought into close proximity, without feeling that these Alabama coal-fields are destined at no distant time to be the seat of an immense mining and manufacturing industry.

It is true that this region is now somewhat removed from our great centers of population and consumption; but with the improvements in water transportation now projected, iron could be carried to Mobile and thence by sea to American and foreign ports more easily than from any other iron-producing region in the Union. Nor should we forget in this connection what a vast future awaits the South with its newly-awakened activity in agriculture and in manufacturing industries; a region offering such advantages of soil and climate as can not fail in the next few years to attract a very large immigration. If we look to the census returns of 1880, we shall find that the eight coastal Southern States, from North Carolina to Texas, with a population of about nine and a quarter millions, showed an increase over that of 1870 of 41·6 per cent, while the increase for the Union, taken as a whole, was but little over 30 per cent. To Alabama, as the great coal and iron-producing State of the South, the chief part of this vast region may be made to a large extent tributary.

Already in 1875, the great natural advantages of Alabama for the manufacture of iron attracted the attention of Isaac Lowthian Bell, who, in a communication to the British Iron and Steel Institute, declared that the region "presents advantageous conditions for the economical production of the metal rarely met with even in Great Britain;" elsewhere asserting that it would "prove a match for any part of the world in the production of cheap iron." Not less striking is the language of Abram S. Hewitt, who says of Alabama: "It is the only place upon the North American continent where it is possible to make iron in competition with the cheap iron of England, as measured not by the wages paid, but by the number of days' labor which enter into its production. The cheapest place on the globe until now for the manufacture of iron is the Cleveland District, in Yorkshire, England. The distance of the coal and iron from the furnaces there averages about twenty miles. Now, in Alabama, the coal and the ore are in many places within half a mile of each other. This region, so exhaustless in supplies, so admirably furnished with coal, so conveniently communicating with the gulf, will be of infinitely more consequence to us for its iron than it has ever been for its cotton. The ore is the foundation of an industry and a prosperity which no curse of slavery, nor rebellion, nor interference with economic laws can ever overturn. I think this will be a region of coke-made iron on a scale grander than has ever been witnessed on the habitable globe."

I have sought on this occasion to call the attention of the members of the Institute of Mining Engineers to some of the more remarkable points in the geology of the coal region of Central Alabama, especially as compared with that of the more northern portions of the same great coal-basin, and to show the intimate and peculiar relations both of the geology and the geography of the region to its economic interests. I have also wished to record the strong impressions made upon me by what I saw there during a late visit of a week. The development in Central Alabama, not only of a great coal trade, but of a vast iron industry, is certain in the near future, and indeed has already begun. I leave for another time and place the discussion of details respecting the region. Meanwhile, it must be said that the geographical position of Alabama, its mineral wealth, its fertile soil, and its favorable climate are destined to give it a pre-eminent place among the Southern States of our Union.

* Second Geological Survey of Pennsylvania, Report E, Azoic Rocks, pp. 202-204.

NEW PUBLICATIONS.

UNITED STATES MINERAL LANDS; *Laws Governing their Occupancy and Disposal; Decisions of Federal and State Courts in Cases Arising thereunder; and Regulations and Rulings of the Land Department in Connection therewith, with Miscellaneous Matter. By* HENRY N. COPP. Second Edition. 1882. Published by the Author, Washington, D. C. Octavo, 649 pages. (*Index.*)

The disaster by which the larger part of the first edition of this book was burned up has been converted into a blessing by the enterprising author, who has availed himself of the opportunity to bring the second edition down to date, introducing into it decisions and other matter obtained since the publication of the first. In its present form, the work is admirably complete and convenient, and constitutes the best manual for study or reference with which we are acquainted. The mining part of Dr. RAYMOND'S *Glossary of Mining and Metallurgical Terms*, published in the first edition, is retained in this.

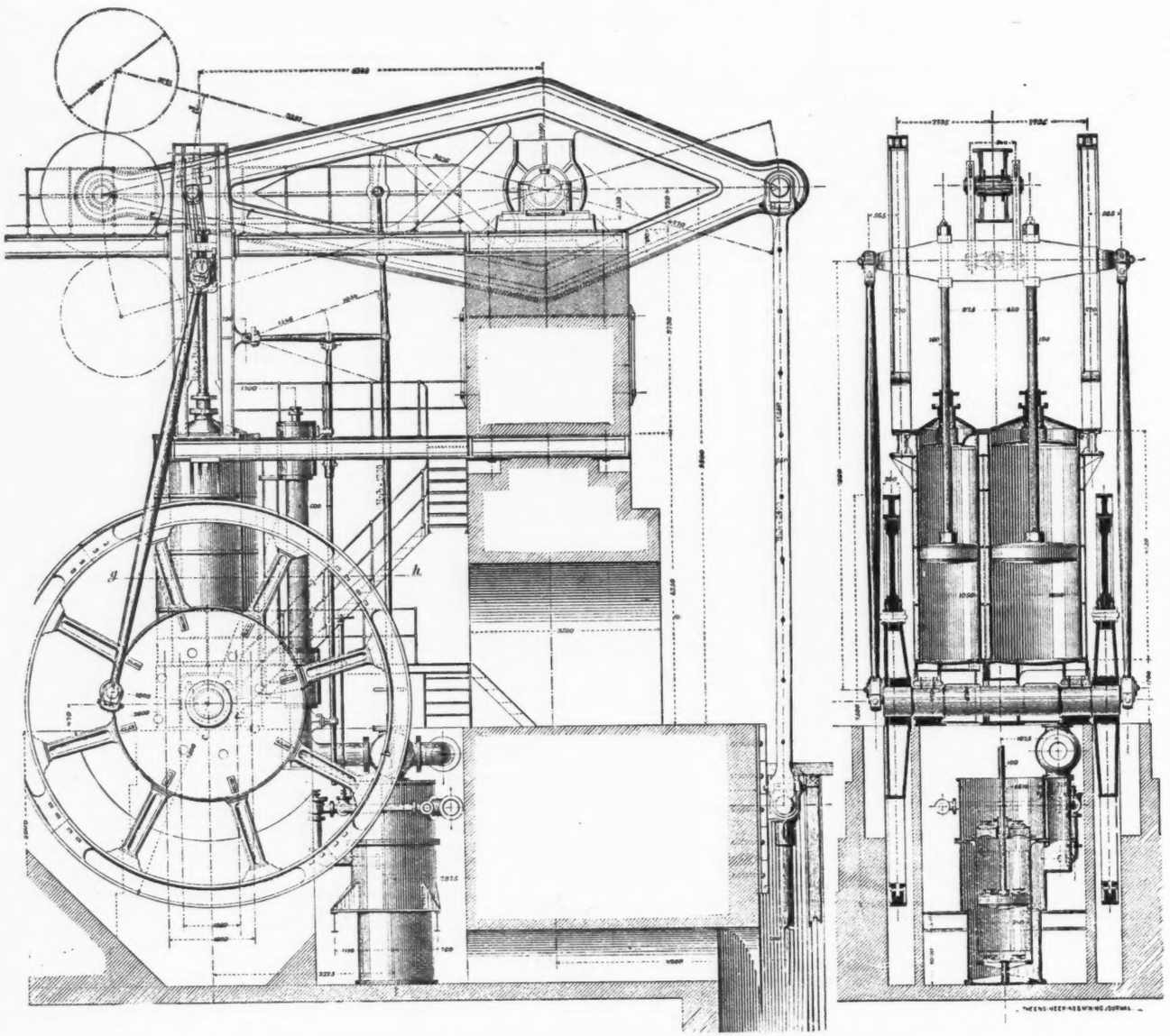
THE STORAGE OF ELECTRICITY. *By* HENRY GREER. New York: N. Y. Agent College of Electrical Engineering. 8vo, 40 pages.

Among the latest developments calculated largely to extend the application of electricity to the arts, none has attracted as much attention and none is as little understood as the "storage" of electricity. The little pamphlet before us, containing as it does popular illustrated accounts of the many various rival systems now struggling for recognition, will, therefore, be welcomed as a timely contribution to the literature on the subject. Mr. Greer appears to have followed progress closely. He devotes special attention to the Brush system of secondary batteries, the latest form of which has ribbed or corrugated plates. We understand that the Brush Electric Light Company is erecting very large works to manufacture the new storage battery.

THE MATERIALS OF ENGINEERING. *In Three Parts. Part I. Non-Metallic Materials: Stone; Timber; Fuels; Lubricants; etc. By* ROBERT H. THURSTON, *A.M., C.E.* New York: John Wiley & Sons. 1883. 8vo, 364 pages, 77 Illustrations. (*Index.*)

Professor Thurston, of the Stevens Institute of Technology, is so widely known as an authority on the strength and quality of materials that any thing coming from his pen is sure to attract attention and appreciation. In the first volume of his work, recently issued, he treats of subjects which he has perhaps, with the exception of lubricants, dealt with less as an original investigator than he has with alloys, metals, iron, and steel. For this reason, possibly, the later volumes will be looked forward to with more expectation. The plan, so far as Part I. reveals it, is simple, and will commend itself alike to those mechanical engineers who take up the topics treated for the first time and to those who propose to use it as a book of reference.

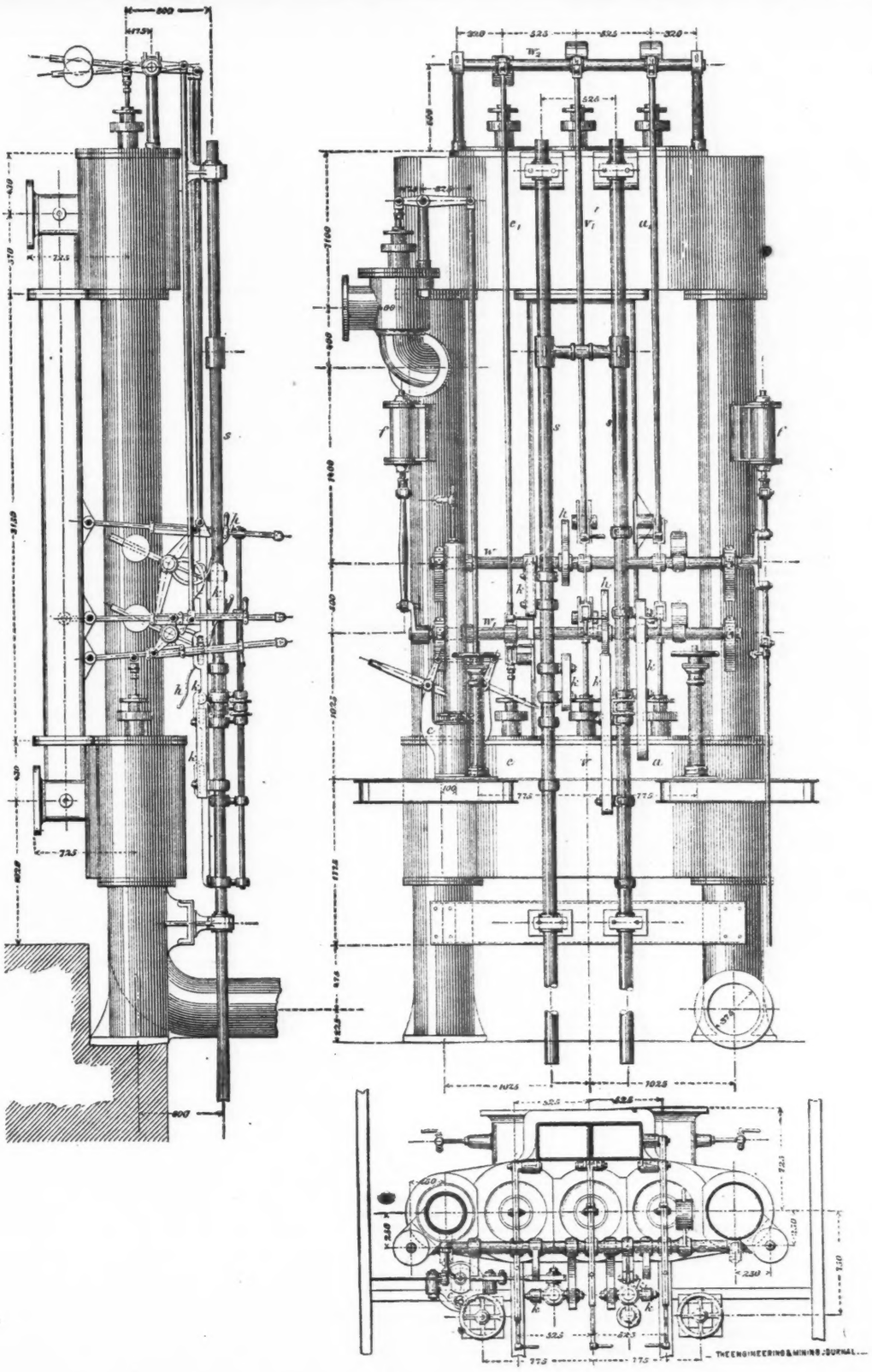
Professor Thurston deals with the materials of engineering one by one, beginning with stones and cements. He sketches their origin, the localities where found, and then goes into a more elaborate discussion of their power of resisting strains and decay. His chapters on timber are, as they naturally should be, very elaborate and thorough. There are numerous well-executed illustrations of American forest-trees, a thorough chapter on the strength of timber, on jointing, the holding power of screws and nails, varnishes and oils, and timber-preserving processes. Fuels are treated in a manner commensurate with the importance of the subject to the mechanical engineer, who, if he desires it, can refer to more elaborate special text-books on the subject. The fifth chapter is that on lubricants, and in it we find frequently the evidences of Professor Thurston's thorough researches on the subject. An appendix contains a handy series of conversion tables.



THE KLEY PUMPING ENGINE.

In Belgium and Germany, the Kley engine for pumping has been gaining favor very rapidly during the last decade for handling the water in coal and metalliferous mines. It is prized particularly because it admits of wide variations in speed to accommodate differences in the flow of water into the mine without affecting the economy of the engines. The Cornish engines, which held sway for so many years for pumping, have the disadvantage that they can not work with expansion, and besides they are liable to breaks, entailing very serious costs for repairs. Ordinary fly-wheel engines will not work at a speed less than four revolutions per minute, so that often, when the flow of water is temporarily small, an extra engine must be provided to handle it, the supply not being great enough to keep the larger engine at work steadily. Herr Kley, of Bonn, Germany, has endeavored to unite the advantages of both types of engines, while avoiding their defects; and from the accounts printed during the last four years in the technical journals of the continent and from records of work submitted, he seems to have succeeded very well. The Kley engine is a beam fly-wheel engine with cataract. It is capable, like the cataract engines, of working with pauses between the strokes; and when a greater speed is required, the cataract is thrown out of gear, though even this has not proved necessary in practice. The fly-wheel is a light one, its function being to regulate the course of the piston, and the mass is so chosen that the momentum stored in it during the beginning of the stroke suffices only to the end, so that the engine comes to a full stop after the crank has passed the dead-center until the cataract mechanism has again caused the admission of steam to the cylinder. These pauses or stops may of course be made as long or as short as necessary, the minimum of strokes depending only upon the maintenance of a vacuum and the heat of the cylinder. It does not make any difference whether the crank comes to a stop before or after the dead-center, the fly-wheel simply moving in the opposite direction. The masses rotating are much smaller than ordinary fly-wheel engines, and those built according to the Kley system are claimed to be more substantial and safer. In the case of a breaking of the pump-rod or the draining of the sump, the cataract does not open the steam-valve, so that breaks are impossible.

As a recent example of the Kley system, we illustrate in the accompanying cuts a compound pumping-engine built for the Rheinpreussen colliery by the Gutehoffnungshuette at Oberhausen, and described by Herr Th. Lempe in the *Zeitschrift des Vereins Deutscher Ingenieure*. As will be seen, the engine has a 1050 millimeter (41·33 inches) high-pressure and a 1600 millimeter (62·99 inches) low-pressure steam-jacketed cylinder placed side by side with a 3600 millimeter (141·73 inches) stroke. The stroke of the pump-rods is 2400 millimeters (94·49 inches), the length of the walking-beam from the center of the pump-rod bearings to the center of the counterweight being 12·73 meters (41·77 feet). The diameter of the two fly-wheels is 7·5 meters (24·61 feet) and the weight of the rim of each 13 tons, the total weight of the engine, exclusive of counterweights, being 243 tons. Steam enters the cylinders through the valves e and e', v and v' being the valves connecting the high and low pressure cylinders, and a and a' being the exhaust-valves. They are actuated by the shafts w and w', the former for the inlet and the latter for the exhaust-valves. The tappets k, attached to s, by means of the



levers *h* bring the shafts *w* and *w'* into their normal position, when all the valves are closed. When moved in one direction, the lower, and when moved in the other, the upper, valves are opened. The movement downward is brought about by the cataract *c*, while the upward movement is effected by the tappets *k'*. Then springs compressed in the box *f*, compressed by the closing movement effected by the tappets *k*, rapidly bring the shafts in the position corresponding to a full opening of the valves. By an adjustment of the cataract and the different tappets *k* and *k'* it is easy to bring the engine to rest after one revolution of the fly-wheel at a point in advance of or beyond the dead-center. In the former case, the crank-shaft will simply oscillate; in the latter, it will revolve with pauses near the dead-center; these stoppages, however, becoming less in amount when the engine is running fast.

The engine illustrated was built for a maximum duty when running at a speed of 10 revolutions per minute of forcing 2·8 cubic meters (740 gallons) of water per minute from a depth of 800 meters (2625 feet) corresponding to 500 horse-power. Upward of 25 engines of the Kley type have been built during the past few years, ranging from 30 to 560 horse-power and working at a speed varying from one revolution every two minutes to 18 revolutions per minute, some being direct-acting, the majority, however, being compound beam engines, cutting off at one-quarter to one eighth of the stroke, the greater number being condensing.

THE SODA INDUSTRY ABROAD.

Before the young but vigorous Society of Chemical Industry recently formed in Great Britain, Mr. Walter Weldon, whose name is so closely identified with progress in that branch during the last decades, read a paper on the present condition and the prospects of the soda industry abroad. His statements, it will be noticed, are full of interest to American miners and chemical manufacturers. The manufacturers of soda by the Leblanc process have fallen upon evil times. For some time past, their profits have been steadily declining, until now they have disappeared and have been replaced in many cases by actual loss. Of twenty-five alkali works which were in operation in the neighborhood of Newcastle-on-Tyne a very few years ago, twelve have been closed, and of these no fewer than eight actually dismantled in despair of it ever again being possible to manufacture soda in them by the Leblanc process, except at a loss. The alkali-making districts of Lancashire have advantages over the Newcastle District in respect of the price of salt, of facilities for supplying the American market, and of nearness to some of the centers of soda consumption; but even in Lancashire seven or eight of the alkali-works are standing idle, and but few of the others are working to their full capacity. In Belgium, the production of Leblanc soda has died out, while in France, Germany, and Austria it is only maintained by the aid of import duties and the large demand for the by-product, hydrochloric acid.

This deplorable condition of the trade is mainly due to the great increase of the output of soda manufactured by the ammonia process, an increase which, though rapid in the past, bids fair to proceed by leaps and bounds in the immediate future. Whether the new process will entirely supersede the old one is a momentous question to those that have invested their money in the latter, and a question not easily answered. Mr. Weldon has set forth the facts which lead him to hope that, although the Leblanc manufacturers have probably not seen the worst, yet that a time may come when they may be able to hold their own against the manufacturers by the ammonia method. At present, he estimates the total annual soda production of the world expressed in terms of pure Na_2CO_3 at 708,725 tons, of which 432,000 tons are manufactured in Great Britain. Twelve per cent of British soda, and 23 per cent of the total soda of the world, are produced by the ammonia method, which was first put into commercial operation in 1866 by Mr. Ernest Solvay, of Brussels. There are now eighteen ammonia soda-works at work in Europe and one in the United States, and seven more are approaching completion.

But serious as this competition is, there is another about to commence that will further tend to aggravate the congestion of the trade, and this is the manufacture of soda combined with the extraction of copper from Spanish pyrites. As is well known, the sulphuric acid used in the Leblanc process is invariably manufactured from the sulphur of pyrites, and the pyrites used in this country is now almost exclusively obtained from Spain or Portugal, and contains from two to three per cent of copper, besides small quantities of silver and gold. After the sulphur has been burnt off, the metals are extracted by the wet process, and what remains is an almost pure oxide of iron that finds a ready sale at fairly remunerative prices. The supply of pyrites is in the hands of three large companies, one of which also sends large quantities to Germany, but up to the present neither has been able to sell any in France. This results from the fact that there are two large deposits of non-cupreous pyrites in France, one in the North and one in the South, both belonging to soda makers, who supply the other manufacturers under contracts of fifteen years' duration, which have yet a considerable time to run. The residual burnt ore, or pyrites cinders, in France has little value, as it is contaminated with sulphur and phosphorus which can not be profitably removed, as there is no copper to be gained at the same time. English cinder contains more sulphur, but this is removed in the extraction of the copper, and the product is pure purple ore that would be of considerable value in France, where the import duty upon cast-iron is greater than the present price of Glasgow pig. To find a market in France for these Spanish ores, the Rio Tinto Company has promoted a subsidiary company, La Compagnie d'Exploitation des Minérals de Rio Tinto, which is to make Leblanc soda in France and elsewhere from Rio Tinto pyrites, relying for its profits neither on soda nor on chlorine, but on copper and oxide of iron. For this company soda and chlorine will be by-products, which it will be glad to sell at a profit if that may be, but which, if not, it will be content to sell for the bare cost of manufacture, thus combining what are now two separate businesses in England, one of which is not without profit, even when pursued without the protection of import duties. It has a works already commenced at Marseilles, and there is a rumor of five others in France; in addition to these, it proposes to erect works at Antwerp and in the United States.

When the ammonia process was introduced, the Leblanc manufacturers anticipated that the demand for ammonia would raise its price very considerably, and thus increase the expense of the process. But the expectation has not been realized, and the price of ammonia is now falling before the increased sources of supply. This is brought about by the Carvé and the Jameson system of extracting ammonia from the gaseous products of coke-ovens, and now tar and ammonia are regularly collected from two of the sixteen blast-furnaces at the Gartsherrie Iron-Works, Scotland. The quantity of ammonia at present obtained corresponds to about 18 cwt. of ammonium sulphate per day, being at the rate of 20 pounds of ammonium sulphate per ton of coal consumed. There are 120 blast-furnaces in Scotland, each consuming, on an average, 50 tons of coal per twenty-four hours. The total amount of coal burnt in them per annum is therefore 2,190,000 tons, which would produce, were it collected, an amount of ammonia equivalent to 20,000 tons of ammonium sulphate, worth at present prices £400,000.

Now, as there seems no likelihood of the ammonia process languishing for want of material, the only hope of the Leblanc manufacturers would seem to lie in cheapening their own process until they can contend with their rivals upon equal terms. Already much has been done, and a large saving effected by means of rigid economy; but this only touches the fringe of the cost; and if the difference of 20s. a ton or thereabouts, that divides the two processes, is to be bridged over, it must be by something more radical than economy in details. The consideration of the direction in which relief is to be sought, and the means to be adopted in accomplishing it, was the primary object of Mr. Weldon's paper. After throwing out a hint that a new field for the utilization of hydrochloric acid, other than the manufacture of chlorine, will shortly appear, the first alleviation that Mr. Weldon insists upon is cheaper pyrites. The present price of 6d. per unit is due to a combination between the vendors, which will expire at the end of next year, when a reduction of 50 per cent may be expected. As to make a ton of actual sodium carbonate by the Leblanc process does not require more than about 13·5 cwt. of pyrites, this reduction in price would only amount to about 7s. 9d. per ton, a little more than a third of the twenty shillings necessary to effect a commercial equilibrium between the processes. But there are still two more resources to make up the balance of the 20s. The first is sulphur recovery, that is, as free sulphur. There has lately arisen a hope that the whole of the sulphur of the calcium sulphide contained in the waste may be recovered in a free state. The actual cost of Sicilian sulphur delivered at Marseilles in bulk is £5 per ton; therefore, to become masters of the sulphur market, and at the same time to gain by the recovered sulphur sufficient to cover their loss, English soda-makers must be able to effect the recovery at a cost not exceeding £2 per ton. They will hardly be able to do this at first, but eventually they may, and then, if the chlorine products should again command a reasonable price, the Leblanc process will be able to hold its own.

The suggestion of the third course comes from Newcastle, and is of much importance to almost every other industry, besides soda-making. It is, that the manufacturer should entirely cease to use raw coal as fuel, but should convert it all into coke, collecting for sale the oil and ammonia evolved during the conversion, and himself using for heating purposes the gases distilled during the coking operation. It is believed that, in the Newcastle District, at any rate, by this mode of proceeding the soda-maker would obtain his fuel virtually for nothing. In that district, there are produced per annum some two millions of tons of very small coal or "duff," which is almost a waste product, and which, singularly enough, yields more oil than the more costly kinds of Newcastle coal, while at the same time yielding a very fair coke, sufficiently good, at any rate, for use in the furnaces of chemical works, especially when its combustion is assisted by that of the gases from the ovens in which the coke is produced; and the value of the oil and ammonia obtained when this "duff" is coked in ovens to which the Jameson system is applied is greater than the cost of the "duff," *plus* the cost of coking it. And it is probable that improved condensing arrangements will render the yield, if not of oil, at any rate of ammonia, so much greater than the yield hitherto actually realized as to enable the same result to be obtained in the case of ordinary steam coal, not only in the Newcastle District, but in the Lancashire District also. If so, the cost of producing Leblanc soda in both districts will be diminished by almost the total amount of the present cost of Leblanc soda for fuel. Mr. Weldon says "almost," because, so far as one can see, the use of raw coal for "mixing" in the black-ash process must still be continued. He believes that this idea can not but be as applicable to almost all other industries as to the soda industry; while the result to the material well-being of mankind of its general application it is utterly beyond the power of any imagination adequately to conceive. This idea means, among other things, cheaper fuel for all purposes, an enormously increased supply of agricultural produce, and the entire suppression of smoke even in the busiest centers of industry. He thinks that the same idea might be applied even to the fuel required for domestic purposes, rendering cities absolutely free from smoke. He holds that the time will come when gas-works will be replaced, at least to a large extent, by establishments in which coal will be treated for the production of coke, illuminating oils, ammonia, and heating gases: the coke to be burnt in domestic fire-places, the oils to be used for lighting the interiors of houses, the ammonia to be employed in agriculture, to cheapen and render more abundant supplies of food, and the gases to be burnt for raising steam for driving dynamos for lighting streets by the electric arc.

AN IMPROVEMENT IN COPPER SMELTING.

Written for the Engineering and Mining Journal by Paul Johnsson, Mining Engineer and Metallurgist, Worcester, Mass.

I propose the following modified copper smelting for large works where different ores are to be dealt with, consisting principally of sulphureted copper ores containing iron.

Four fifths of all copper produced in the world is made from sulphureted copper ores containing a considerable quantity of iron combined with sulphur. The general principle followed for making marketable copper in the dry way (for which either only reverberatory furnaces, or a combination of reverberatory and shaft-furnaces are employed) is, first, to carry all the earthy matters into the slag and concentrate the copper in a matte, by mixing roasted or oxidized ores with raw ores, and smelting down. The aim is to obtain a matte containing generally from 30 to 40 per cent copper, about 26 per cent sulphur, and the rest principally iron.

The next step is to get rid of most of the iron and part of the sulphur, in order to obtain a product approaching Cu_2S. This is done by one or more fusions of the first calcined matte, generally mixed with rich oxidized ores or rich slags from succeeding processes. This fusion is generally carried out in a reverberatory furnace. The number of concentrations depends on the purity of the ores, or whether they contain gold or silver, which is to be extracted. If the ores are pure and hold no gold or silver, the matte first obtained is calcined to such a point, and the addition of rich ores made in such a way, that, by the first fusion, white or pimpled metal is obtained.

This product is now exposed to an oxidizing smelting, called roasting, in a reverberatory furnace, to get rid of the sulphur and the greatest part of the other remaining impurities. Cu_2S is oxidized to CuO which, acting on Cu_2S, reduces Cu, which, in consequence of its higher specific gravity, goes to the bottom and there collects. The process is carried on until all the copper is reduced and the absorbed sulphuric acid has worked off, when the product is tapped as blister copper.

This blister copper is now refined by scorifying through oxidation the remaining impurities, skimming them away with the slag, and reducing by poling the cupreous oxide dissolved in the copper, thus obtaining copper in a tough state.

I propose to substitute for this method another requiring less time and cost. The principle is based on the known fact that, when copper matte in a sufficiently heated molten state is exposed to the action of strong blast, the iron and sulphur are oxidized, generating heat before it acts on the copper. I will give a general sketch of the process, afterward dealing with the details.

By running down the ores in a shaft-furnace, I get rid of the gangue, and have the copper concentrated in a matte holding about 35 per cent copper. This matte, mixed with rich oxidized ores and refinery slags, is smelted down with an oxidizing flame in a Siemens furnace; the heated molten mass is exposed to the action of hot blast, through inclined tuyeres, thus oxidizing the iron and sulphur. When a proper quantity of iron is scorified, the blast is shut off and the slag skimmed. This done, the blast is put on, and this is repeated until the iron and sulphur are oxidized, and the product obtained is blister copper. This is refined in the usual way, preferably in large charges in a Siemens refining furnace.

As for the concentration of the copper in a matte containing about 35 per cent copper, this may be done cheapest, quickest, and best in a shaft-furnace of large capacity, say from 100 to 150 tons per twenty-four hours, either in a Raschette or, still better, in a round Pilz-Mansfeld furnace with from 6 to 8 tuyeres, and wider at the top than at the bottom, thus allowing greater hight to the furnace, and consequently economizing fuel, but at the same time preventing the reducing effect of the furnace from increasing to disadvantage. By making up the charge in a proper way and careful feeding, these furnaces give far better results than others. Experience has proved that the least copper is lost in the slag when a matte is obtained from the charge containing about 35 per cent copper and 26 per cent sulphur, and the slag is rich in iron between bisilicate and monosilicate. The loss of copper in this smelting is caused only by shots of matte suspended in the slag. It is, therefore, desirable to get a slag, which, at a temperature not too high, is sufficiently liquid, and the specific gravity of which at the same time is low, allowing the shots of metal to pass easily through.

This matte is now to be treated in a Siemens furnace, which ought to have a sufficient length of hearth in order to utilize the flame, and a deep and a strong bed, in order longer to resist the corroding action of the oxidized iron, and to be able to hold a charge of at least 10 tons of matte. Below the fire-bridge, and between the hearth and regenerators, there ought to be an air-space, in order to cool off the sides of the hearth. The roof should consist of two arches, the lower of fire-brick, the upper of common brick, in order to let the blast pass through the space between them and be heated at the same time that the lower vault is cooled off, in order better to resist the heat of the flame. In the middle of each of the sides of the furnace, and opposite each other, are two working and charging doors. Through one of these, the furnace-man pulls out the slag, the helper at the same time pushing it toward him with the rabble through the other, thus allowing the slag to be skimmed off quickly, completely, and in a practical way. On each of the sides of the furnace, are four or five tuyere-holes, so arranged that, if tuyeres are put in and the blast let on, this will strike the surface of the molten metal at an angle of from 35 to 40 degrees at a distance of from 1½ to 2 feet from the side. These tuyere-holes are arranged at the same distance from each other between the ends of the hearth, directed at right angles to the length of the furnace. The tuyeres ought to allow a strong concentrated jet of air to strike the surface, and should be arranged so as to be capable of being pulled out when the blast is shut off, in order that the tuyere-holes may be closed up, thus preventing cold air from entering and cooling off the furnace. The matte from the cupola-furnace is mixed with rich oxidized ores and refinery slags, and a charge of about 10 tons put in the furnace. The charge is smelted down with an oxidizing flame, the slag is stirred with the rabble, and some siliceous flux is put in if necessary. The charge may always be made up beforehand in such a way that this is not necessary at the first skimming. The tuyere-holes are now closed up with clay or in any other way, and a good heat given for a quarter of an hour or twenty minutes, in order to get the slag fully liquid, so that a good separation of the shots of metal from the slag may take place, and that the sulphide of iron may surrender its sulphur to the cupreous oxide and take the place of the latter as FeO, if cupreous oxide should occur in the slag. The slag being liquid enough, is skimmed off; some siliceous flux is put in, in order to saturate the oxidized iron formed during the following oxidizing process; the heat is raised, and when it is high enough, the blast is put on. By the inclination of the tuyeres, strong pressure on the hot blast, and its concentration in smaller jets, the heat generated by the oxidation of the iron and sulphur ought to increase and maintain the temperature in the furnace so far that, when the reaction has fully commenced, the gas may be entirely or considerably decreased. The jets of blast will of course stir up very vigorously the molten bath of metal, causing new particles to be exposed to the action of the air, and also causing a very rapid oxidation, mixing the oxidized particles with the sulphureted ones, forming sulphurous acid, which passes away, and oxidized iron, which rises to the surface. When enough slag has accumulated, the blast is shut off, the tuyere-holes closed up, siliceous fluxes are put in, the slag stirred, and heat given as before, to separate slag and metal, and to have FeS to convert Cu_2O to Cu_2S. In order to obtain a more complete separation and reaction, longer time is now required than at first. The slag is again skimmed off, and the process kept up in this way until most of the iron is scorified. At this stage of the process, the product consists chiefly of sulphide of copper; the blast now oxidizes both the sulphur and copper, forming cupreous oxide, which reduces the metallic copper from sulphide of copper. The metallic copper sinks to the bottom and there collects. When most of the sulphur is oxidized, the blast is shut off and the cupreous oxide dissolved allowed to reduce the remaining sulphide of copper. The sulphurous acid having worked off, the heat is raised, the thin slag skimmed off, and the product tapped as blister or set copper. The furnace-man requires, of course, some practice to know the right moment when to shut off the blast, in order to get blister copper. If the blast is kept on a little longer than necessary, more copper will pass into the slag; but the product obtained will, in consequence of its containing more dissolved cupreous oxide, be so much easier to refine. The slag from the first skimmings will contain less copper than the later ones, and by putting in proper fluxing substances, they may be poor enough to throw away. The later ones may be run down in the cupola-furnace, together with the ores. When the charge has been tapped out, the bed is carefully mended with silica, and the furnace is ready for the next charge. It would, perhaps, be an improvement to tap the product, when in a state of strong pimple metal, in a heated converter, and Bessemerize it. The making of blister or set copper from pimple metal would then only require from ten to fifteen minutes, and the disadvantage of the Bessemerizing of poorer metal in a converter, on account of the strong corroding action of the iron on the lining, would now be got rid of. The sulphur would pass away as sulphurous acid, and the blowing might be kept up so far as to obtain a somewhat dry copper. The slag very rich in copper would be put into the Siemens furnace.

The Siemens furnace ought, of course, to have great advantage over the common English reverberatory furnace. With a Siemens furnace and hot blast, the two conditions that are essential to the success and rapid execution of the process, namely, a strong heat and a strong oxidizing blast, may be completely controlled; when the heat generated by the oxidation of the iron and sulphur is sufficient to carry on the process, the gas may be shut off, thus saving fuel. In France, copper matte is treated in a converter with success; but starting on a matte with only from 20 to 30 per cent copper, the great quantity of iron that is to be scorified, and which must take the necessary silica from the lining, must be taken into consideration. I think the reverberatory furnace, with blast through inclined tuyeres, is the most natural and practical furnace to treat a product of such quality. The slag formed may easily be skimmed off, and fluxing substances put in when necessary, giving a clean slag, and at the same time preventing a too strong corroding action of the iron on the lining. The metal being concentrated to strong pimple metal, when scarcely any thing but sulphur is to be removed in order to get copper, the converter ought to be the most natural furnace for this process. The question is only whether the time and quality of copper gained by Bessemerizing would pay the increased cost of the converter and its management. The converter could be used many times before mending its lining, and could probably have the same blowing-engine as the Siemens furnace. By this way of treating matte, especially by using a converter for treating the product when brought to pimple metal, a charge of ten tons, holding 40 per cent copper, may easily be brought up to blister copper in from ten to twelve hours.

This blister copper may now be refined in the usual way: but I think a Siemens furnace is even here to be preferred, provided that, by washing or in any other way, the gas produced is made sufficiently free from impure matter. If these experiments are executed by a person who understands this matter not only theoretically, but has had to do himself practically with copper smelting, I am sure they will prove successful.

In order to compare the advantage of this proposed process over that now generally in use, we may see what is required for making a certain quantity of copper in either way, supposing we start from matte containing about 35 per cent copper, and which, by the admixture of rich oxidized ores, is made up to contain 40 per cent copper.

If a charge of a little more than ten tons is treated in the Siemens furnace, this may in twelve hours turn out four tons of blister copper. Supposing one furnace-man and two helpers are required for the furnace, this will require in addition one man for the gas-producer and one engineer for the blowing-engine. That is, for making eight tons of blister copper in twenty-four hours, one Siemens furnace and ten men are required.

Let us now see what is required for the same work in the usual way now in use. At one of the larger copper-works of this kind in the United States, they use, in order to calcine the crushed matte, four calciners, each treating 2½ tons in twenty-four hours, calcining away from a matte of about 25 per cent sulphur from 10 to 15 per cent, requiring per shift three men. There are required besides three men for the crusher, and one engineer, that is, fourteen men in twenty-four hours. In order to do the double work in twenty-four hours, there may thus be required eight calciners and at least twenty-four men, if one larger crusher has to do all the work of crushing. If this calcined matte, by fusion in a reverberatory furnace in charges of five tons each in twelve hours, turns out strong white metal, I think the result is considered good. In order to make twenty tons calcined matte up to strong white metal in twenty-four hours, are thus required two reverberatory furnaces and eight men. From ten to twelve tons white metal thus obtained are now to be made up to eight tons of blister copper by roasting in twenty-four hours. This may be done by two reverberatory furnaces in twenty-four hours, each treating from five to six tons white metal and requiring eight men. Supposing the cost of keeping the blower for the Siemens furnace to be equal to the cost of the crusher for the calciners, the question is reduced to this point: Is it cheaper to bring twenty tons of matte to blister copper in one furnace in twenty-four hours, with fuel and repairs required for one furnace, and ten men, than to do the same work in eight calciners, four reverberatory furnaces, with fuel and repairs to all these, and forty men? I claim, too, that the blister copper from the Siemens furnace, on account of the increased heat and strong oxidizing blast, may not contain more—on the contrary less—impurities than the copper from the other process, though by this process it has required only one sixth of that time.

The Corrosion of Iron and Steel.—At a recent meeting of the Paris Academy of Sciences, a paper was read describing some researches by M. Gruner, on the relative corrosion of cast-iron, steel, and soft iron. Various plates, suspended in a frame by their four corners, were immersed simultaneously in water acidulated with 0·5 per cent of sulphuric acid, or sea-water, or were simply exposed in moist air of a terrace foundry. In moist air, chrome steels were corroded most rapidly, and tungsten steel less than carbon steel. Cast-iron, even when high in manganese, is oxidized less than steel and soft iron, and white forge pig less than gray foundry-iron. Sea-water, on the other hand, attacks cast-iron more than steel, and with special energy white iron. Tempered steel is less attacked than the same steel annealed, soft steel less than steel high in manganese or chrome steel, etc. Acidulated water, like sea-water, dissolves gray pig-iron more rapidly than steel, but not white iron; the gray impure pig-iron is most strongly attacked. These results agree with the complete experiments on the subject by Mallet in 1843.

OFFICIAL STATEMENTS AND REPORTS.

QUINCY MINING COMPANY, LAKE SUPERIOR, MICHIGAN.

The directors of the Quincy copper mine, the most productive on the lake, after the Calumet & Hecla, have just issued their report on the business of the mine during the year 1882. The shipment of the season was 6,853,660 pounds of mineral, which has been smelted, and yielded about 82·67 per cent, or 5,665,796 pounds of refined copper. The product of the mine for the year, as prepared for shipment, was 6,874,230 pounds, or 3437 $\frac{230}{2000}$ tons of mineral, of which 6,508,410 pounds were stamp copper, and 365,820 pounds mass—a total of 6,874,230 pounds; for which, estimating copper on hand in New York at 18 cents per pound, and the product left over at the mine at 82 per cent yield and 15 cents per pound, has been realized the gross sum of $970,363.27, to which must be added $6142.83, realized from sale of silver, making a total of $973,506.10.

The expenses of the year were as follows: Running expenses at mine, $381,010.82; building and construction account, $63,427.63; smelting, transportation, and all other expenses, $96,969.13; making a total of $541,407.58; which, deducted from gross earnings, $973,506.10, leaves as mining profit $432,098.52. There has also been realized during the year, from interest and profit on sale of company's stock, $16,455.33, carrying the total to $448,553.85. The statement of assets and liabilities in the last report showed a balance on hand, as of date January 1st, 1882, $735,313.79, to which add earnings of 1882, $448,553.85, or $1,183,867.64. Deducting the dividend of February 20th, 1882, of $320,000, and the dividend of August 21st, 1882, of $200,000, a total of $520,000, leaves a balance of assets, January 1st, 1883, $663,867.64.

A dividend of $6 per share, or $240,000, payable February 15th, has been declared, which, with the dividend of $5 per share paid August 21st last, makes the total for the year $440,000. The total dividends paid to date aggregate $3,300,000.

The Quincy, at the beginning of the year, was carrying a stock of 880,000 pounds of copper.

The following is a brief summary for the year:

Average force employed	438 men.
" number of miners	152 "
" wages of miners on contract, per month	$48.83
Yield of mineral per fathom of ground broken	970 lbs.
" refined copper per fathom of ground broken	800 "
Total rock mined	120,377 tons.
" " hoisted	109,751 "
" stamp-rock treated	101,327 "
Yield of stamp-rock treated (3·21 per cent)	6,508,410 lbs.
Product mineral	6,874,230 "
" refined copper	5,682,663 "

The report of the agent, Mr. F. G. White, shows that the mine was in a satisfactory position.

IRON SILVER MINING COMPANY, LEADVILLE, COLORADO.

In accordance with a resolution passed at the last annual meeting of this company, making the close of the fiscal year correspond with the close of the calendar year, the Board of Trustees have submitteda report for the five months ended December 31st. The total receipts for that period were $1,047,387.32, while the expenditures were $697,667.52, leaving a profit of $349,719.80. By the payment of $400,000 in dividends, the cash on hand on March 1st, 1882, of $182,605.27, has been reduced to $132,325.07, making the surplus, including timber and supplies on hand, at the beginning of the year $151,153.78. The trustees say: "There have never been any stated times for the payment of dividends. The rule has been to pay dividends of $100,000 whenever there was on hand the sum of $200,000, thus always keeping a reserve of not less than $100,000; and the sentiment of your Board of Trustees is, that this reserve should rather be increased than diminished."

The report in conclusion gives the following data:

Ore produced in ten months, 60,186 dry tons; average moisture, 12 per cent; product of silver, 895,426 ounces; product of lead, 34,360,856 pounds; average number of employés, 500.

Mining work accomplished as per report of surveyor: Stopes, 4012 cubic fathoms; shafts, 305 feet; winzes and rises, 1096 feet; drifts, 11,626 feet.

The mining captains report the mine fully as well opened, and as much ore in sight as at the date of the last report, February 28th, 1882. There is, therefore, every reasonable prospect that the business of the coming year may be comparatively as successful as that of the last year.

PROGRESS IN SCIENCE AND THE ARTS.

Amber in New Jersey.—Mr. G. F. Kunz, in a paper read before the New York Academy of Sciences, describes a mass twenty inches long, six inches wide, and one inch thick, and weighing sixty-four ounces, found at Kirby's marl-pit, on Old Man's Creek, near Harrisonville, Gloucester County, New Jersey, about twelve months ago. A one quarter inch section showed a light grayish-yellow color. A section one and a quarter inch thick showed a light, very transparent yellowish-brown color. The entire mass was filled with botryoidal-shaped cavities filled with glauconite or green sand, and a trace of vivianite. The hardness is the same as the Baltic amber, only slightly tougher and cutting more like horn, and the cut surface showing a curious pearly luster, differing in this respect from any other amber yet examined by Mr. Kunz. This luster is not produced by the impurities, for the clearest parts show it the best. It admitted of a very good polish. The specific gravity of a very pure piece of the carefully selected amber is 1·061, which is the lowest density on record, the usual amber range being from 1·065 to 1·081. It ignites in the same way as other ambers. It was found at a depth of twenty-eight feet, in and under twenty feet of the Cretaceous marl, the amber being found in a six-foot stratum of fossils.

Boracic Lagoons in Italy.—An interesting report upon the springs in the province of Pisa, Italy, which yield boracic acid, has recently been issued by the United States Consul at Leghorn. The district in which the springs occur belongs entirely to one owner, the Count de Lardarel, who in his seven "borax" villages has most conscientiously looked after the welfare, moral and social, of his work-people. Although the whole of the neighborhood contains most extensive borax deposits, it is not from these sources that the most abundant supplies are obtained, but from shallow artesian wells. The boring, however, is carried down until the well yields water, when the machinery is withdrawn and water let into the shallow pond previously dug around the bore-hole. This water becomes heated up to boiling-point and impregnated with the borax, which rushes up from the opening of the artesian well, after which the water is drawn off and evaporated by passing it over a series of shallow metal pans, from 15 to 20 in number, arranged like a cascade. The borax, as it reaches the bottom pan, is half solidified, and when cold has the appearance of being frozen over with a skin of rotten ice. This skin is removed and strewed on the floor of a drying-house, heated by hot pipes, and by this means the borax becomes crystallized. The lagoons have a most peculiar aspect during the issue of the borax. When full of water, the boiling is continuous, rising to some feet in hight, and the vapor is unpleasant from its sulphurous odor. The smell of sulphur, indeed, pervades every thing about the establishment, and every thing in the shape of metal is discolored. The quantity of borax produced from the estate averages from 3 tons to 3½ tons a day; but as this is only one of the borax villages (though the most profitable), the total yield may be put down at 11 tons per diem. Upward of 1800 laborers are employed on the property, of whom 800 are exclusively engaged in the production of the acid.

THE *Chemiker-Zeitung* quotes from a German journal devoted to the sugar industry an advertisement asking for the services of an "academically educated chemist, fully acquainted with the manufacture of sugar, who can undertake in summer the coppersmith's work, or the oversight of the teams of draught-oxen." This is a little worse than an American iron-master who wanted a chemist capable of keeping a watch on his phosphorus and teaching the cornet for laborer's wages.

AT a fancy dress ball, held at Hull, England, recently, a lady somewhat electrified the remainder of the company by appearing with incandescent lamps arranged about her person. To quote a local contemporary: "Small incandescent lamps were artistically introduced into the headdress and other portions of the costume, and the electricity was supplied by a gentleman who was in attendance with a box representing a hand-organ, from which were wires attached to the lamps." According to this extract, it seems a matter of conjecture as to whether the source of the electricity was the gentleman in attendance or the box representing a hand-organ. The fact of the matter is, that the box was a bichromate battery, which, together with the lamps and fittings, had been supplied by Mr. T. Muse, an electrician of Hull.

DIVERS IN A CORNISH MINE.—We are indebted to Mr. R. J. Frecheville, of Truro, for the following account of the first diving operation of the kind carried out in a Cornish mine. The heavy and almost incessant rains during the winter have so increased the water in the Phœnix United Mines, Liskeard, that it has risen above the plunger-pole, which is situated 200 fathoms from the surface. After the plunger had been working some time under water, it failed to work satisfactorily. Soon after, it was discovered that it required to be packed, and the question arose as to how the obstruction was to be removed, there being from 10 to 20 feet of water above the top of the pole. The manager and agents held a consultation, and decided to engage the service of a diver. This course was generally approved in the mines, and was accordingly adopted. At first, one diver and his assistant came to the mines, and prepared themselves to perform a piece of work underground which they had never before seen. They, however, determined to make an attempt in a vigorous manner, knowing that, if their efforts were successful, much credit would be reflected on them, as it was the first time any such work by divers had been done in mining operations. The diver succeeded in packing the pole, and a signal was given to the engine-man to work the engine. It started, and the plunger-pole worked in a very satisfactory manner all night; but in the morning, the shaft-men ascertained that the pole had failed, and wanted to be attended to again. The diver prepared and packed the pole the second time, and continued to attend to it until the work was deemed too laborious for one man to continue to do, and the service of a second diver was called in to perform the same kind of work as the former.

FURNACE, MILL, AND FACTORY.

The Philadelphia Hydraulic Works have just completed a 5500-pound steam-hammer, for Anderson, Du Puy & Co., of Pittsburg, and are building a similar hammer for the Co-operative Iron and Steel Works, of Danville, Pa.

For a long time past, the Russians have drawn their supplies of steel shovels almost exclusively from America. Latterly, the Germans have competed for the trade. Two steel-works at Witten, in Westphalia, have succeeded in producing shovels which, according to the German Consul-General at Moscow, are fully equal to the American make and nearly one third cheaper. The import trade in American shovels has consequently nearly ceased.

It is proposed to increase the capital stock of the Glamorgan Iron Company, of Lynchburg, Va., to $80,000.

At Jonesboro', Ala., the site has been selected for one of the largest iron and coal enterprises in the State, and the plans are prepared already.

A Northern company has purchased the iron bed near Rome, Ga., and another blast-furnace will very soon be erected.

The directors of the suspended Union Iron and Steel Company held a meeting at Chicago on the 28th ult., at which, it is said, that it was resolved to submit a proposition to the stockholders at a meeting to be held on March 12th, to issue $1,400,000 of preferred stock on which to start the mills again.

The Republic Iron Mining Company has released its attachment against Brown, Bonnell & Co., and affairs are advancing so favorably under the direction of Receiver Brown that it is expected that the fires will be relighted, and that a start will be made in all departments on the 4th. Many contracts are received, and a determination is expressed to assist Brown, Bonnell & Co. through their present embarrassment.

The firm of D. W. R. Read & Co., a prominent firm of iron-ore importers, of New York, Philadelphia, Baltimore, and London, has suspended.

The managers of the Smithsonian Institution have undertaken to present in all the leading branches of mechanical and manufacturing industry examples on the one hand of the old, crude, and primitive appliances which exist as relics of a past age, and on the other the most approved specimens of American machines or devices which those arts in their modern state afford. In that branch of industrial science which comprises the utilization of the power of water, the managers of the Institution have selected the James Leffel Double Turbine as a representative modern American water-wheel, embodying the most improved and efficient means for the development of water-power as applied to the propulsion of all kinds of machinery. To this end, they requested the firm of James

Leffel & Co. to furnish them a specimen of the Leffel wheel, to be placed in the new National Museum building lately completed, adjoining the original structure of the Institution, where it will form a part of the collection of the best modern machinery which is now forming on the plan above described. The wheel asked for by the Smithsonian Institution has been made at the shops of James Leffel & Co., in Springfield, Ohio, and is now at their office at 110 Liberty street, New York. It is not a "model" merely, but a working wheel of 7⅝ inches diameter, one of the regular sizes made by the firm. It differs in no respect from those of their ordinary make, save in its ornamental finish, upon which special care has naturally been bestowed. The gates and gate-rods are plated with gold, and the other parts of the casing with silver.

The sheriff of Washington County, Pa., will sell, on March 27th, the property known as the Antietam Iron-Works, situated in the Sharpsburg District, owned by Daniel V. Ahl, of Newville, Pennsylvania. The works are sold under an execution issued at the suit of the Hagerstown Bank.

J. M. Downing & Co., proprietors of the tube-works in New Castle, have made a proposition to the citizens of Mercer, Pa., to remove their establishment there, provided they will raise $10,000 and furnish a location. Eight thousand five hundred dollars of the amount has already been raised.

The Lehigh bar and guide mill, connected with the Allentown, Pa., rolling-mill, has started. The mill was shut down three weeks ago to make extensive repairs.

The Youngstown steel-works, after numerous delays caused by the non-arrival of machinery, commenced active operations this week by producing steel, the main object being to test their converters and ascertain if every thing was satisfactory.

The Lambert & Bishop Wire Fence Company, in Joliet, Ill., has had plans prepared for a new mill, and will soon begin on it.

The Red Wing furnace, at Sharon, Pa., will probably soon blow out.

A company has been formed in Pittsburg to work the Adams direct process. They will take the works of the Siemens-Anderson company at Linden.

A new firm has been formed, composed of Andrew Carnegie and Henry Phipps, of the Edgar Thomson Steel-Works; H. W. Hartman, formerly of the Gautier Wire-Works, of Johnstown; J. L. Ellwood, wire fence manufacturer, of New York; Mr. Stiles, of Chicago; and Mr. Sears, of Wisconsin. These gentlemen have purchased about twenty acres of land in Beaver Falls, Pa., where they will erect works on a large scale for the manufacture of nail rods, wire, barbed fence wire, etc. The various articles manufactured by the company will be made from Bessemer ingots obtained from the Edgar Thomson Steel-Works.

Dispatches from St. Louis, which look as though they were "inspired," state that great trouble is experienced at the works of the Vulcan Steel Company in its rail department, in its effort to run it without union men.

The Ashland furnace, at Ashland, Ky., has started up again, having been banked on account of rise of water.

It is said that the Billings & Spencer Company, Hartford, Conn., does the largest drop-forging business in the United States. It runs twenty-five drop-hammers, ten presses, one atmospheric and four tilt-hammers, and manufactures upward of 2000 different aricles for parts of guns, pistols, sewing-machines, special machinery, and machinists' tools, besides manufacturing a large variety of goods in a finished state.

A meeting of the Western Nail Association was held in Pittsburg, on the 20th ult., in conformity with a resolution passed at the last regular session, two weeks ago, which was to the effect that work should be resumed in the mills, and continued for a fortnight only, when it would then be decided whether the state of trade would warrant a further run, or whether another suspension would be necessary. A resolution was passed unanimously providing for a stoppage of all nail mills west of the Alleghany Mountains for a period of two weeks, commencing March 4th. Trade was reported fair and the stocks on hand quite light. The stoppage is considered necessary to prevent accumulation of stocks, and to thereby keep the market in a healthy condition. It not being a regular meeting, no action was taken as to prices, neither was there any action taken on the disposition of Eastern manufacturers to cut prices.

Parties representing the Columbus & Hocking Valley Coal and Iron Company consolidation have been in session for two days at Columbus closing up the business and getting ready for operations. The capital stock of the company is $5,000,000, with an estimated cash basis of over half that amount. The consolidation elected a board of directors, which organized as follows: Samuel Thomas, of New York, President; T. Longstreth and Walter Crafts, of Columbus, and J. R. Buchtel, of Akron, Vice-Presidents; S. Churchill, Treasurer; and H. D. Turney, Secretary. J. S. Farlow, of Boston, is a member of the board of directors.

Mr. Horace Ware has sold his furnace, its machinery, and all the lands connected with the operation of this business, to Charles Cobb, of New York; John F. Dickson, of Marshall, Texas; and the Marshall Car and Foundry Company, for $40,000. It is said the purchasers will very soon remove the car-works, now at Marshall, to the furnace, and greatly enlarge the business.

The Cleveland Furnace Company, a furnace and iron company operating under a lease at Steubenville, failed this week; liabilities, $90,000; assets, from $30,000 to $40,000. Inquiries among ore-dealers and others developed the statement that the company, which is a small concern, failed six weeks ago, but was given an extension of time. Mr. F. A. Bates is president of the company, and Mr. W. P. Murray, Secretary.

A number of English capitalists, among them Sir Titus Salt, Charles Stead, and C. Howson, are expected to visit Tennessee at an early date, to examine the Dayton coal mines and a number of iron deposits, with a view to the investment of large amounts of capital in iron and steel manufacturing.

GENERAL MINING NEWS.

ARIZONA.

The following companies have filed articles of incorporation: Ajo Mining and Development Company. Blue Jacket Mining and Milling Company. Central Illinois Mining and Reduction Company. Columbia Copper Company No. 3. Morning Star Consolidated Mining Company. Morning Star and Crescent Consolidated Silver Mining Company. Randolph Mining Company. Sidney Mill and Mining Company. Sonora Coal and Construction Company. Takoma Copper Company. Yavapai Mining Company.

The purchasers of the Peabody mine, at Russellville, are grading for the erection of two more smelters.

COCHISE COUNTY—TOMBSTONE DISTRICT.

A large body of ore has been struck near the side-line of the Good Enough mine, at a depth of 126 feet, the shaft having passed through limestone nearly the entire distance. The extent of the ore-body is not yet developed. Considerable horn-silver is appearing in the west side.

McMahon won the suit against the Last Chance mine, recovering one half.

The 400 level of Contention shows an ore-body over 40 feet in width.

Forty thousand shares of the Emerald Company's stock have been taken by capitalists. The consideration is a certain amount of development-work to be done in shafts, drifts, and cross-cuts. In sinking the shaft the last 20 feet, the ore doubled in value. Extensive development is to begin at once. The Aunt Sally shaft is down 30 feet, all in ore, and is to be sunk to the depth of 100 feet.

Ore has been struck in the Gilded Age mine, assaying $2000 per ton.

PIMA COUNTY.

A report says that there is great excitement over a remarkable silver discovery twenty miles south of Tucson, in the Santa Rita Mountains. The ore-crossing is 100 feet wide and over a mile long. One claim to the property has just been purchased.

HOWARD MINING COMPANY.—The average of ten assays was $9772.76 in silver. This rich ore-streak was found in the Great Republic mine, the property of the company, in a winze sinking below the 200-foot level at a depth of about 20 feet. This company has a complete mill. It has a battery of ten stamps, and has every thing in shape to increase it to 20 stamps if necessary. It also has eight Frue concentrators and roasters, so that it is prepared to treat any kind of ore that may be found in the mine.

CALIFORNIA.

The following companies have filed articles of incorporation: Buchanan Gold Mining Company. Capital, $2,000,000. Directors: John A. Davis, W. Hamilton, Alexander Warner, F. F. Moulton, A. Martin. Inyo Borax Company. Capital, $50,000. Directors: J. D. Langborne, Jr., Robert E. McGill, John T. O'Brien, Henry Glass, and Charles C. Kinsey. Lucky Hill Mining Company. Capital, $10,0000,00; shares, 100,000. Directors: Alexander McAbee, Max Gruenberg, Charles Shaw, A. K. Greene, John Carlin. Mexican Mill and Mining Company. Capital, $60,000; shares, 1200. Directors: John Cushing, Allen D. Cushing, John W. Phillips, W. L. McCrary, Grant I. Taggart, and W. Dingee. Principal place of business, Oakland. Myrtle Gold Mining Company. Capital, $2,000,000; shares, 100,000. Directors: M. M. Estee, John H. Boalt, Ramon E. Wilson, C. T. Bridge, W. E. Sell. San Miguel & La Trinidad Consolidated Silver Mining Company. Capital, $240,000; shares, 24,000. Operations, Mexico. Directors: M. Rosenbaum, George Johnson, John Rodda, J. Bandmann, and C. Nobmann. Zilka Gold Mining Company. Operations, Colorado. Directors: Orrin Skinner, of Quincy, Ill., Henry H. Lynch, Beverly S. Taylor, Frank G. Newland, and J. J. Corrigan.

SAN BERNARDINO COUNTY—PROVIDENCE MINING DISTRICT.

The railroad has been completed to Providence, reaching an extensive mining country.

The mines which are worked in the district show generally good results.

BONANZA KING.—The mill is turning out 2000 ounces of bullion daily. It is reported that a new strike of extraordinarily rich ore has been made in the extreme north end of the first level of this company's mine.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GENESEE.—It is reported that the mill will start up shortly.

GREEN LEDGE.—A force of men has been put to work. The tunnel has been cleared up and pay-ore is now taken out; the best ore has a copper stain and contains a small amount of sulphurets. The average value of the ore, as worked in an arrastra, has been, thus far, $30 per ton. The bullion is very fine, being worth $19.50 per ounce. The men are at work in a rich pocket in a drift below the tunnel, and about 200 feet from its mouth; when this is got into proper order, a new tunnel will be started on the ledge, where it crops out on the surface, and run in till it strikes the breast of the present workings.

CANADA.

NEW BRUNSWICK.

Quispamsis Mining Company. Capital, $300,000; shares, 60,000. Incorporators: George F. French and F. J. Lewis of Boston; Thomas Elston and F. J. Baldwin of Somerville, Mass.; and Alfred A. and Robert O. Stockton, of St. John, N. B.

The St. John *Telegraph* says that some years ago silver was discovered on the James F. Wanamake farm, Hammond River, King's County. The deposit is about three miles from the St. Martins and Upham Railroad. A lease of the land has been secured by Messrs. James Robertson and Robert Shearman, of Albert mines, and D. N. Webster, of Salisbury, and they will form a company to work the mine. Analyses have been made by Professor Burwash, of Sackville, and Mr. Best, of St. John. Professor Burwash's analysis shows: Lead, 26 per cent; silver, 22 ounces troy to ton of lead; gold, 10 pwt. to ton.

NOVA SCOTIA.

According to the Halifax *Herald*, valuable manganese mines have been discovered at Tenny Cape, Cheverie, Walton, and Truro, giving ores of the best quality. At Tenny Cape and Cheverie, the mines have been worked by the proprietors for some years. At Walton, most valuable deposits have been discovered, the ore being of the highest grades. A company is now forming to work this mine, under the name of the Eureka Manganese Mining Company, which will commence operations immediately. At Truro, the St. James Manganese Company is in operation, and the outlook for the return from its mine is also very promising.

COXHEATH MINING COMPANY.—A report from Halifax says that the company has taken out a silver license at the Mines Department there, covering its entire copper areas in Cape Breton, owing to the ore showing a larger percentage of the richer metal as greater depth was attained. It is said these recent developments add considerably to the value of the property and are arousing some excitement among mining speculators.

PROVINCE OF QUEBEC.

The following analysis of apatite taken from the township of Templeton, Ottawa County, has been furnished us by Messrs. Benedict & Cole, of this city:

Phosphoric acid *	40·812
Fluorine †	3·554
Chlorine ‡	0·040
Carbonic acid §	0·518
Lime	49·102
Calcium	3·763
Magnesia	0·620
Alumina	0·565
Sesquioxide of iron	0·125
Alkalies	?
Insoluble residue	0·630
	99·729

COLORADO.

The following companies have filed articles of incorporation:

Alcove Consolidation Mining Company. Capital, $500,000; shares, 50,000. Operations, Colorado. Directors: Q. J. Wellington, J. J. Pochon, and Sparoc Wellington. Principal office, Colorado Springs; branch offices in New York and Chicago. Belleville Mining, Smelting and Prospecting Company. Capital, $200,000. Operations, Colorado. Principal office, Belleville, Ill. Bowman Mining Company. Capital, $100,000. Operations, Colorado. Directors: J. B. Bowman, A. D. Breed, and H. B. Gillespie. Principal office, Stamford, Conn. Cape Cod Mining and Reduction Company. Capital, $260,000; shares, $10 each. Operations, Colorado. Directors: W. C. Armor, George C. Hallett, C. E. Smith, Samuel Eldridge, and J. E. Benjamin. Principal office, Golden. Celina Mining and Milling Company. Capital, $5,000,000; shares, $100 each. Operations, Ouray County. Directors: Judge C. M. Hughes, of Lima, Ohio; Christopher Schenck, David J. Roop, Stephen Howick, Seth S. Snyder, of Celina, Ohio; and James C. Weller and William H. Gebbert, of Colorado. Principal office, Celina, Ohio. Climax Mining and Milling Company. Capital, $2,000,000; shares, $10 each. Operations, Gilpin County. Directors: Henry Perrse, Mark M. Pomeroy, John J. Rilley, J. E. Still, and J. W. Plunkett. Principal office, Denver. Denver & Mount Carbon Coal Company. Capital, $150,000; shares, $10 each. Operations, Jefferson County. Directors: A. E. Burwell, George S.

* Equal to 89·098 tribasic phosphate of lime.
† " " 7·295 fluoride of calcium.
‡ " " 0·062 chloride of calcium.
§ " " 1·177 carbonate of lime.

Lee, James W. Jefferson, W. J. Lee, and S. Richards. Principal office, Denver. Dome Mining Company. Capital, $30,000; shares, $100 each. Operations, El Paso County. Directors: Linus E. Sherman, George M. Arnold, Theodore Ingalshe. A. Z. Shelkon, and William J. Bail. Principal office, Colorado Springs. East Hukill Gold and Silver Mining Company. Capital, $500,000. Operations, Colorado. Directors: William M. Shaw, E. B. Parvin, R. H. Shaw, and Dr. G. F. Hoop. Principal office will be at Clearfield, Pa. Enterprise Consolidated Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Summit County. Directors: Joseph Reynolds, Alfred J. Cross, George H. Loplin, of Chicago; John R. Cleveland, of Arapahoe County, and John D. Morrisey, of Lake County. Principal office, Robinson. Fort Collins Land, Mining, and Coal Company. Capital, $25,000. Operations, Larimer County. Directors: Andrew James, Frederick A. Crane, and Alexander McGregor. The principal office will be at Fort Collins. Grand Island Silver Mining and Milling Company. Capital, $5,000,000; shares, $5 each. Operations, Boulder County. Directors: N. E. Nicholson, A. E. Powell, Thomas Wilkins, F. Irving Davis, and W. H. Nicholson. Principal office, Boston, Mass. Harlem Gold Mining Company. Capital, $100,000; shares, $10 each. Operations, Gilpin County. Directors: Edwards, Peter French, Oscar Versettish, and William Freden. Principal office, Central City. Hibernia Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Lake County. Directors: Dennis Sullivan, James V. Dexter, Homer Pennock, Herman Berger, and Sylvester Nichols. Office, Leadville. Jamestown Mining and Tunnel Company. Capital, $1,000,000; shares, $10 each. Operations, Boulder County. Directors: Samuel P. Barbee, A. B. Ingolls, J. D. Alkine, Leonard Alkine, A. J. McCorkle, W. F. Thompson, A. W. Hilles, J. C. Carter, and D. T. Sanderson. Principal office, Denver. Keystone Gold and Silver Mining Company. Capital, $60,000; shares, $10 each. Operations, Chaffee County. Directors: Charles S. Hill, Thomas R. French, Edmund Tabor, Samuel H. Manifold, P. R. Bolm, John O. Wilson, and George O. Dobyne. Principal office, Buena Vista. Lake Mountain Milling, Mining, and Smelting Company. Capital, $50,000; shares, $10 each. Operations, San Juan County. Directors: G. C. Marshall, W. H. Edeburn, L. L. McCully, J. Y. Hamilton, E. S. Townsend, James Fitzsimmons, R. S. Cochrane, Joseph F. Denniston, and James Godfrey. Principal office, Mineral City. Louis Cook Mining, Milling, and Developing Company; Capital, $1,500,000; shares, $10 each. Operations, Colorado. Louis Cook, James Hockheimer, and James R. Johnson are three out of the five directors to be appointed. Missouri & Colorado Mining Company. Capital, $500,000; shares, $100 each. Operations, Chaffee County. Directors: James H. Payne, John R. Stoller, H. P. Bickford, William Small, and Richard I. Boggess. Principal business office at mines, and an office at Kansas City, Missouri. Mount Sneffles Mining Company. Capital, $500,000; shares, $10 each. Operations, Ouray County. Incorporators: Robert A. Burnett, Charles Hamm, and James Whitehead. Principal office, Ouray. Ohio Consolidated Mining and Milling Company. Capital, $1,000,000; shares, $10 each. Operations, Ouray County. Directors: Lewis Scott, Robert C. Fawcett, and Hiram Kirby, Principal office, Ophir. Pembroke Mining Company. Capital, $1,000,000; shares, $5 each. Operations, Colorado. Incorporators: J. Pembroke Thom, W. Stewart Polk, John Gill, De Courcey W. Thom, Stephen Bonsal, Charles D. Fisher, P. Lea Thom, and Willoughby N. Smith. Principal office, Baltimore, Md. Rico Reduction and Mining Company. Capital, $500,000; shares, $25 each. Operations, Colorado. Directors: D. J. Neff, Hon. Samuel Calvin, Hon John Dean, H. C. Dern, Theodore C. Wigton, A. B. Hoover, A. A. Stevens, Hon. John Reily, and Dave Caldwell. Principal office, Horse Gulch, Rico, and branch office, Altoona, Penn. Silver Cloud Mining Company. Capital, $500,000; shares, $10 each. Operations, Colorado and Illinois. Directors: Albert Brendel, James A. Landon, James G. Jansen, Marvin R. Brainard, Henry Kline, James Low, and Josiah S. Wolfe. Principal business offices are to be at Howardsville, San Juan County, Colo., and Chicago, Ill. St. Louis Syndicate Mining Company. Capital, $2,000,000; shares, $10 each. Operations, Colorado. Directors: John F. Watkins, William A. Adams, Henry Stanley, Edwin L. Doris, William R. Moore, George H. Lawer. Principal office, St. Louis, Mo. Stockholm Mining Company. Capital, $300,000; shares, $10 each. Operations, Summit County. Directors: H. A. Plimpton, F. A. Malins, H. W. Pollitz, D. Jackson, and Emerson Gee. Principal office, Red Cliff. Summit Consolidated Mining Company. Capital, $1,250,000; shares, $10 each. Operations, Clear Creek County. Incorporators: Melvin Edwards, Russell F. Lord, of Georgetown, Colo.; Major James H. Lord and William Sturgis, Jr., of Cheyenne. Principal office, Georgetown. Branch office, Cheyenne, Wyoming. Tecolate Silver Mining Company. Capital, $1,000,000; shares, $10 each. Operations, Mexico. Directors: W. T. Heldrup, James Harlan, J. E. Rutherford, George Macklin, J. B. Coate, Charles L. Bailey, D. L. Jauss, George G. Boyle, and J. M. Dickey. Principal office at Colorado Springs, Colo., and branch office at Santa Barbara, Mexico. Tower Mountain Silver Mining Company. Capital, $500,000; shares, $10 each. Operations, Colorado. Incorporators: Tunis W. Van Hosen, Peter Gray, William V. McGrath, William Devine, Thomas Morris, and William J. Gray. Principal office at Philadelphia, Pennsylvania, and branch office at Silverton. Viola Mining and Smelting Company. Capital, $250,000; shares, $10 each. Operations, Idaho and Colorado. Incorporators: Charles B. Rustin, Amos H. Fowler, Theodore Berdell, and Nathaniel Witherell. Principal office, Denver. What Cheer Company. Capital, $1,000,000; 1,000,000 shares. Operations, Colorado. Directors: David Skeeles, William Crein, and Thomas R. Lee. Offices, Ophir and Carrolton, Ohio. White Star Tunnel Mining Company. Capital, $300,000; shares, $10 each. Operations, Gilpin County. Directors: James Powell, James E. Powell, and Gerald Leahy. Principal office, Black Hawk.

CLEAR CREEK COUNTY.

GOOD LUCK.—The tunnel is driving into the mountain; it is now in 1250 feet. At this point they are raising a winze to connect with a drift which is extending from the bottom of the main shaft, which is now 560 feet in depth. When this connection is made, it will drain the mine and give it good ventilation and save largely in expense.

LITTLE MATTIE.—The Argo mine has disposed of one half of its property to this company for $10,000. Machinery will be erected immediately, and the property will be developed extensively.

POLAR STAR LODE.—The work of clearing out the mine is nearly completed.

SNOWDRIFT.—The lower level east shows three feet of quartz, interspersed throughout with rich sulphurets. The formation is appearing in the level above, which seems to indicate a body of ore coming up from below eastwardly. The proposed seventy-foot shaft at the cross-cut from the lower level is down four feet.

WALLACE.—The company will build a concentrator either at the mouth or the head of Ute Creek, in the near future. The company has also purchased the Cecil lode. The Wallace and Cecil lodes are the extension of the Freeland mine on the west, and both properties will be extensively developed.

GUNNISON COUNTY.

ISLET.—The mill was shut down after running the Goldsmith ore, and will not be started again until some radical changes and additions have been made. Among these is contemplated an increase of the capacity to twenty or forty tons; the substitution of a 75 horse-power boiler and engine for the present ones, which have proved inadequate to drive even the present machinery; the procuring of new screens, and also additional pan room for the present furnace, which is capable of treating ten tons of ore per day, while the pans are insufficient for more than four.

LAKE COUNTY.

Late Leadville exchanges contain the following:

The great flow of water in the deeper shafts on the north side of Fryer Hill, seriously interfering with the work in the deeper shafts for the past two years, is reported to have greatly abated, and in some instances nearly ceased. In consequence, quite a number of the shafts have resumed work.

AMIE.—This property is producing a great deal of ore, of all possible grades and varieties, at present. The property has a number of lessees working upon it, most prominent of whom are those who secured the No. 3 shaft and contiguous territory. The mine from this shaft is producing about 125 tons daily, ranging from ten to forty dollars per ton. About 140 men are at present on the pay-rolls of the lessees, and worked in eight and ten-hour shifts.

BIG PITTSBURG.—The company has stopped all its leases except the one upon the Haytrosser shaft. Manager Bulkley began on work for the company the Lent shaft during the week, but, owing to trouble with the machinery, a temporary suspension was found necessary. Work will be resumed.

CHRYSOLITE.—The company is still engaged in pushing work on the incline from the Colorado Chief No. 2 shaft, and a small streak of pay-ore has been disclosed in the second or lower body of iron, but no pay. Recent developments confirm the statement that there are two distinct bodies of iron in this portion of Fryer Hill, being separated by eighty to ninety feet of rock. A new strike, of doubtful importance, has been made in the past week in the Colorado Chief shaft, worked on a lease of Mr. J. C. Langhorne and others.

COLONEL SELLERS.—The mine, situated on the south side of Iron Hill, has resumed the sinking of the shaft. The new pumps are handling the water with ease, and no further trouble in this direction is anticipated. The shaft is still in ore of low grade.

HENRIETT.—The continuation of the Henriett incline recently encountered another large water-course, and the flow of water since then has seriously retarded work in this particular portion of the mine. Manager Harker expects to drain the water from the incline in a short time, when development will be renewed. The mine is looking well and producing regularly.

IRON SILVER.—The Stone mine continues making an average daily output of two hundred tons of ore. The large production of the property necessitates economy in handling the ore, and to provide proper facilities, a large force is engaged in surface improvements. About forty men are employed in grading and cutting away a portion of Iron Hill, in order to make room for the large ore-bins, now at the Rock mine, which are to be removed to this side of the gulch. The No. 6 Stone shaft, situated on the north side of the road, having a depth of sixty feet, and formerly used exclusively as a timber shaft, is to be utilized in hoisting ore. At the Moyer shaft, work is at a stand-still, except the steam-pumps, which are kept in operation maintaining the shaft's freedom from water to some extent, though of insufficient capacity to permit the sinking of the shaft, now down one hundred and ninety feet, to greater depth.

THESPIAN SHAFT.—The shaft on Carbonate Hill has recently passed through the contact-matter and struck lime at a depth of about six hundred feet. Drifting in the limestone has been commenced, and it is hoped that a chute of mineral may be encountered at no great distance from the shaft.

SUMMIT COUNTY.

CLINTON.—A correspondent of the Denver *Republican*, in speaking of this mine, says that the mining operations in that camp are in a very prosperous condition, with the promise of an increased ore output for the coming year. The Clinton especially has rapidly enhanced in value under the extensive development which has been made. The mine is now opened by an incliue 550 feet in length, from which six levels are extended, having an aggregate length of 300 feet. All these headings are in ore of shipping grade, and the daily output is now thirty tons of a value of $30 per ton. Thirty men are employed and a tramway is constructing by which the ore will be delivered to the track of the Rio Grande Railroad about 1000 feet distant, at the base of Battle Mountain.

QUEEN OF THE WEST.—The Ten Mile *News* says that the mine has shut down. The prevailing opinion, which seems to gain ground from the reticence of the owners, is, that the mine has been sold.

ROBINSON.—The mine continues to ship about three or four car-loads per day, which, it is presumed, includes the shipments made by Mr. Doolan from his lease, which will expire on the first of March.

WHITE QUAIL.—The company has paid off its indebtedness to George R. Fisher & Co., and as soon as the sheriff's fees, over which there is some dispute, are adjusted, work will be resumed on the mine.

DAKOTA.

CALEDONIA.—The company is sinking a winze from the 100 level to the depth of 150 feet. The winze is now down thirty feet. The mine shows marked improvement, the ore-body having a width of eighty feet.

FATHER DE SMET.—The report of the superintendent for week ended February 15th shows ore extracted from first, second, and third levels, 1750 tons; ore milled, 1800 tons. Water short from the 8th to 13th inst. Third level header advanced 6 feet; header in 134 feet; Italian winze advanced 12 feet; winze down 53 feet; north end tunnel advanced 10 feet; tunnel in 815 feet.

FLORENCE.—The mill is still idle. Machinery for its enlargement is awaited.

SITTING BULL.—The smelter will fire up March 1st.

SUMMIT.—The mill is in successful operation on Initial ore.

GEORGIA.

The Dahlonega *Signal* says:

GOLDSMITH.—The new placer is worked. The company has been washing off the clay for the past week, and intends to wash the gravel this and next week. A ditch from the Fish Trap extension has just been completed, and a reservoir 1000 feet in length. After every thing is ready, the intention is to run a little giant, which will reduce expenses greatly, and increase the yield.

IDAHO.

POCAHONTAS.—This company has been organized to develop the well-known Washington lode, which is situated five miles north of Galena, on the mountain that divides the waters of the Wood and Salmon rivers. It outcrops the entire length of the claim—1500 feet. A smelter will be built by the company the coming summer.

SAWTOOTH GOLD AND SILVER MINING COMPANY.—This company has been organized in San Francisco to develop the Jupiter, Justice, Ophir, and Midnight mines. The mines are located within one mile of Sawtooth, in Beaver Cañon. The Jupiter is opened by a shaft 125 feet deep—at which depth the ore-body is 38 inches wide and ore is in the shaft all the way from the surface down, averaging 38 inches in width. The Justice is a smaller vein, dipping at an angle of 45 degrees, and is in granite formation with a slate hanging-wall, and strong, heavy clay gangue on the foot-wall. The vein-matter is quartz containing ruby silver, which has produced up to $1900 in silver and $420 in gold to the ton. The silver ore is black sulphurets, ruby, and stephanite. The vein carries 11 inches of ore at a depth of 35 feet, which is the lowest point yet reached on the vein. The Ophir is a 35-foot vein, cut across on the surface from wall to wall, and all the ore exposed is free milling and averages 57 ounces in silver per ton. It crops out strong a distance of two miles, and carries a uniform width of 35 feet. It is quartz carrying ruby, native, and wire silver, and some gold. The Midnight is not much developed, as the deepest work on this mine is 12 feet. The ore is continuous and free milling, ruby, stephanite, and native silver, carrying 135 ounces to the ton, and some gold. The vein is 28 inches wide. A new mill is to be built.

MAINE.

HERCULES.—Work upon this mine, says the Bangor *Journal*, was suspended last fall from lack of funds, as some of the stockholders declined to pay their assessments and the management was unwilling to run the mine into debt. The mine itself never looked so promising as on the day it was shut down. The ore-vein was more than four feet thick and rapidly widening, of nearly solid zinc-blende

and galena, containing scarcely any rock. During the past few months, several of the leading stockholders have been quietly buying up the shares held by the obstructionists, with a view to place them in the hands of those who will be willing to assist in pushing the work of development in the spring, and arrangements are now making to start up the mine about the first of April. Every thing at the mine is in perfect working order, and the facilities for shipment are excellent, the company's new wharf being probably the best in Hancock County.

MEXICO.

We have received the following letter:

I see, by your issue of December, 9th, a notice of the Candelaria of this place, which calls for a word of comment from me. It is remarkable principally for the number of errors that are compressed into so few lines, being an epitome of a report by Mr. R. E. Chism, who was here as my book-keeper for a year and a half, and afterward in charge of the property about a year more. Mr. Chism was aided in his suits by two lawyers, Don Francisco Alvarado and Don Luis Fernandez. The "unscrupulousness" of Don Toribio Rocha consisted in trying to collect a just debt which has since been paid.

As "one Temple, a former officer of the company, who seems to be ignorant on all questions of mining," was appointed by the court "*interrentor interino*" (receiver) in one of the suits, and in that capacity found it necessary to put Mr. Chism in jail, it is quite natural that in Chism's eyes he should be "ignorant on all questions," not only of "mining" but every thing else. A. V. TEMPLE.

SAN DIMAS, MEXICO, Jan. 24, 1883.

A German firm proposes to put up reduction-works at Chihuahua, shipping the product to refining-works in Germany.

The foundations for the concentrating-works now erecting on the banks of the Pachuca River by the American Company are well under way. The work is under the direction of Superintendent D. Browne, who has general charge and management, and is pushing the work rapidly. Mr. A. J. Elian has been appointed master-mechanic of the works.

Extensive machinery for the new Progreso reduction-works at Pachuca has arrived at Vera Cruz, and will be erected at once.

The Atargea mine of El Chico District, Hidalgo, is now drained by an adit, and stopes are opening on a rich body of ore discovered just before the influx of the water. The adit works well, and the extraction of ore is more than sufficient to cover expenses, though the stopes on the ore-body are not yet fully opened.

NEW YORK MEXICAN MINING COMPANY.—At the annual meeting held in Covington, the following officers were elected: President, Ira A. Hutchinson, of Columbus; Vice-President, J. M. Clark, of Cincinnati; Second Vice President and General Manager, resident in Mexico, A. B. Clark; Treasurer, C. O. Lockard Cincinnati; Secretary, Edward Worthington, Cincinnati. The report shows that the company has its machinery in operation, and it is now engaged in taking out and reducing its ore. The returns are of a nature that fulfill expectations, and leave no room for doubt as to the profitableness of the work.

MICHIGAN.

Custer Mining Company. Operations, Michigan. Officers, President, John McKenna; Vice-President, James H. Gee; Secretary and Treasurer, James H. Malloy; Directors, John McKenna, James H. Gee, James H. Malloy, Hugh McLaughlin, James M. Gray. Summit Exploring, Mining and Manufacturing Company. Capital, $1,200,000. Operations, Michigan. Directors, G. M. Wakefield, J. R. Morgan, D. L. Libbey, J. L. Mead, J. B. Davis, H. H. Stafford. Tobin Exploring, Mining, and Manufacturing Company. Capital, $600,000; 24,000 shares. Operations, Michigan. Officers, President, James Tobin; Vice-President, G. H. Gile; Secretary, E. T. Ellsworth; Treasurer, Frank Heilig; Executive Board: G. M. Wakefield, G. H. Gile, and George A. Fay.

CENTENNIAL.—The stamp-mill has been temporarily shut down, and other surface work, except such as is absolutely necessary in conjunction with underground operations, has been discontinued. Operations (underground) will for the present be confined to sinking and drifting. The openings at bottom and on either side of Nos. 1 and 2 shafts are looking very well, and sinking will be pushed in both, at the same time the second level drift will be carried north to connect Nos. 1 and 2 shafts as speedily as possible.

MONTANA.

BELL.—A contract has been let to sink a three-compartment shaft to the depth of 400 feet, the contractors stipulating to complete the work in one hundred days. While the shaft is sinking, no extensive operations will be conducted in the old workings, and most of the force has been laid off. The new shaft will be sunk about midway between the two ledges and at a point 60 feet east of the present main shaft, or 500 feet east of the west end line. At the depth of 300 feet, it is the intention to connect the new shaft with the old workings by a cross-cut run south from the latter, and thereafter the two old shafts will be abandoned for hoisting purposes. At a depth of 400 feet, north and south cross-cuts will be extended from the new shaft to intersect both ledges, and as soon as possible thereafter the smelter will be started at its full capacity. One furnace, however, will be fired up about the middle of April on ore which has been already extracted, and of which there is between $50,000 and $75,000 worth available for reduction at the smelter.

BROADWAY.—The sinking of the shaft to prove the further extent of the ore-body will be continued. Should the result of the development prove satisfactory, the mill will be refitted with new machinery and the treatment of the ore under a new and improved process will be resumed.

MOULTON.—During the past month, work has been vigorously pushed on the south cross-cut from the west 300. The vein has now been penetrated a distance of 14 feet, a small streak of very rich ore was cut into, a picked sample from which assayed 478 ounces. The vein pitches a little southward and trends westward, and a west drift on the vein has been started. Development in the north drift of the 300 last week was also quite satisfactory, an 18-inch ledge of high-grade ore having been uncovered in the west drift from the north cross-cut. Sufficient ore is produced to keep the 40 stamps at the mill constantly dropping. The mill is making a remarkable run, having now run fifty-five days without an hour's stoppage.

NEVADA.

The Berryman Tunnel and Mining Company has filed articles of incorporation. The trustees are: Henry K. Mitchell, Louis Dibber, D. R. Sessions, M. H. Joseph, and Richard Berryman.

ALBION.—A large number of heavy attachments against the company were filed in the county clerk's office at San Francisco recently. There appeared to be concert of action on the part of many creditors. The total amount of attachments so far filed is $61,027. It is alleged that if claims are presented in a similar way, the amount will reach $150,000. It is stated that work in the mines continues, and one furnace is kept running to its fullest capacity.

EUREKA TUNNEL.—A strike was made recently in what is known as the Sullivan chamber of the Eureka tunnel, some sixty feet below the tunnel level. The face of the drift is all in ore, which extends below, above, and on both sides, for a distance of six feet in. Two assays made from the new find go $125 and $150 per ton. The ore is of the character common in the mine. It is stated that the mine is looking remarkably well generally, and that ore has been found in several other places, with favorable indications for prospecting.

TUSCARORA.

NAVAJO.—The latest official information is to the effect that there is sufficient ore broken down in the stopes of the mine to run the mill for nine months; that the 450 level is developed by winzes, and the level opened, from which no ore has been extracted; that the mine has large ore-reserves above the 350 level, and is shipping $80,000 per month from a 10-stamp mill. The company has $150,000 cash in the treasury.

WISCONSIN.

The Silver Creek Mining and Milling Company has filed articles of incorporation. The capital is $500,000.

WYOMING.

A correspondent of the Salt Lake *Tribune* reports on some mines situated in the Miner's Delight Mining District as follows: About a year ago, some miners who were working some placers in Strawberry Gulch struck a ledge crossing the gulch, in an east and west direction, the decomposed, (barren) rock, as they thought, looked so favorable, they concluded to pan some of the same, which they did with favorable results. They immediately located a quartz vein, calling the same the Bullion. A shaft was sunk and a ten-stamp mill erected. The first clean-up resulted in $16 per ton, the second in $22, and the third in $29. While water is found within less than five feet of the surface on the ledge, still the same can not as yet be procured in desirable quantities for running the mill steadily. A well has been sunk at the mill forty-two feet in depth, which has served to keep the mine dry (the deepest shaft sunk on the ledge being twenty-seven feet). Prospecting has been done in various places on the claim, and everywhere the ore is uniform in value with that at discovery. It has been stripped on the surface for 100 feet in width on the ledge with like results. The character of the ore in the First West Extension, the Second (Midas) and Third (Dahlonega) extensions of the Bullion is the same as that found in the Bullion, but there has been no development of either of the three properties mentioned. The ore in a claim situated about two miles from the Bullion appears to be different from that found in any of the above-mentioned claims, being black slate and iron, and from assays shows from $90 to $160 gold per ton. The vein is said to be five feet wide. Several other claims which show favorable prospects will be developed by the owners in the spring. There are within a radius of twelve miles of Strawberry Gulch, seven mills, some steam, some water, with from five to twenty stamps, the owners of which would work ore, or possibly sell. An abundance of timber, with splendid roads to haul the same. There is an abundance of water in Rock Creek, Willow Creek, and Sweetwater for running water mills. Hundreds of claims are lying idle, and many others which are worked could be purchased at reasonable prices.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Julia Travers (administratrix), Manquetta lode.

CALIFORNIA.

SACRAMENTO DISTRICT.

William Backlage *et al.*, Golden State quartz lode. Peter Hories, Old Road placer mine.

SHASTA DISTRICT.

Winthrop Mining Company, Excelsior mine and mill-site.

COLORADO.

CENTRAL CITY DISTRICT.

Harley B. Morse, Golden Treasure lode. Silver Ledge Consolidated Mining Company, Silver Ledge lode. James B. Tourtellot *et al.*, December lode. Harry M. Thompson, Lucia lode. Christian Clausen, Old Settler lode. King Gold Mining Company, Skeleton lode. Marcus W. Rasback, Mohawk lode. George B. Tayler, Maggie lode. Franklin E. Morse, Telephone lode. Henry N. Coffey, Western Slope lode. Petter C. Hasen *et al.*, Concrete lode. Gardner B. Weeks *et al.*, Mackey lode. George B. Bonnell *et al.*, Bismarck lode. Ellis F. Olden, Tiller House and Grand Gift lodes. Chiga & Middle Park Mining, Prospecting, and Real Estate Company, east half of the Grand Lake lode.

DEL NORTE DISTRICT.

Golconda Gold Mining Company, Nick lode.

DURANGO DISTRICT.

Joseph P. Hale, Staatsburg, Missouri Girl, and Arlington lodes. John Monroe *et al.*, Richmond lode. Robert L. Martin, Lead Chief lode. Midland Mining Company, Henry Ashurst lode.

LAKE CITY DISTRICT.

H. B. Adsit *et al.*, Silver Star lode. Midland Mining Company, Augustus Begole and Cimarron lodes. Charles W. Lewis *et al.*, Mayflower lode. John S. Hough *et al.*, Carbonate Queen and F. X. Aubury lodes. H. L. Norton, Green Mountain lode. Serrano Silver Mining Company, Serrano lode. W. W. Humphreys *et al.*, Richmond lode. Henry A. Wood, Black Silver lode.

LEADVILLE DISTRICT.

Charles H. Riggins *et al.*, Josephine lode. A. R. Byrd *et al.*, La Plata lode. Samuel Hilton *et al.*, Colorado Mint and Big Sunflower lodes. Millionaire Mining and Tunneling Company of Colorado, Millionaire and Newark lodes. C. Markell, Harrisburg and La Salle lodes. John H. North *et al.*, State of Maine lode. Silver Cord Combination Mining Company, A. P. Willard lode. Unexpected Mining Company, Unexpected lode. L. D. Kneeland *et al.*, Peerless lode. D. H. Elder *et al.*, D. H. Elder lode. James R. Mead, C. Z. lode. Berlin Mining Company, B. F. D. and Venus lodes. Smuggler Mining Company, Smuggler lode. James L. Welch, Maid of the Mist lode. W. S. Maxwell *et al.*, Bella lode. Manistee Mining Company, Manistee lode. Edwin Fry *et al.*, Senator lode. George Jess, Bond, Echo, and Badger lodes. B. M. Arms *et al.*, Lord Baltimore lode. F. Walworth Smith *et al.*, Revenue Cutter lode. Frederick Lottes, his placer in Gunnison County.

PUEBLO DISTRICT.

Empire Gold and Silver Mining Company, Copper Bottom lode.

DAKOTA.

DEADWOOD DISTRICT.

Henry Frawley *et al.*, Cora Ella lode.

IDAHO.

OXFORD DISTRICT.

Robert C. Beardsley, Beardsley quartz mine.

MONTANA.

HELENA DISTRICT.

Adam Farady, Skip lode. Frank Shootin *et al.*, Silver Tick lode. William T. McClintock, Eclipse, Iron Age, and Aurora lodes and mill-sites. Robert S. Hale, his placer in Lewis and Clark County. William Tiernan, his placer in Madison County.

NEVADA.

CARSON CITY DISTRICT.

Consolidated Virginia Mining Company, Comstock lode.

UTAH.

SALT LAKE CITY DISTRICT.

R. C. Chambers, administrator, Union lode. James R. Sheepbach *et. al.*, Nimrod lode. Old Hickory Mining and Smelting Company, Old Hickory lode. Charles M. Sickles, Alta lode. Monroe Salisbury, Benham lode. Patrick Mallory *et al.*, Jay Hawker lode.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Feb. 24. H.	Feb. 24. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	March 1. H.	March 1. L.	March 2. H.	March 2. L.		Sales.	§
1	Alice S. C.	Mont	$10 000,000	400,000	$25	*	.....	....	.....	$400,000	Dec.	1881	.10	3.55	3.45	3.45	.....	3.55	3.35	3.45	3.25	3.25	3.00	3.05	3.00	1	9,600	....
2	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*	.....	....	.....	305,000	May	1880	.10	.21	.....	.22	.20	.20	.19	.19	.....	.21	.19	.22	.21	2	25,700	....
3	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	140,000	Feb.	1882	$2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	B.
4	Argenta, S.	Nev.	10,000,000	100,000	100	225,000	Nov	1882	.25	40,000	Feb.	1880	.20	.50	.....	.....	.....	.....	.....	.40	.35	.....	.....	.....	.....	4	800	....
5	Barbee & Walker, S.	Utah	1,000,000	100,000	10	*	.....	....	.....	60,000	Nov	1880	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	....
6	Bassick, G. S.	Colo.	10,000,000	100,000	100	*	.....	....	.....	25,000	Feb.	1880	.25	8.50	8.25	9.00	8.50	.....	.....	10.75	.....	.....	.....	10.50	.....	6	627	....
7	Belle Isle, S.	Nev.	10,000,000	100,000	100	65,000	May	188	.10	300,000	Dec.	1879	.25	.....	.....	.80	.75	.....	.....	.....	.....	.75	.....	.50	.....	7	1,700	....
8	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	8-9,000	Sept	1882	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	S.F.
9	Belcher, G. S.	Nev.	10,490,000	104,900	100	2,762,000	Sept	1882	.25	15,397,000	Apl.	1876	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	950	S.F.
10	Bodie Con., G.	Cal.	10,000,000	100,000	100	125,000	Dec.	1881	.50	1,295,000	Nov	1882	.20	.....	.....	.....	.....	1.40	.....	1.75	1⅞	1.75	.....	.....	.....	10	.....	.....
11	Boston & Mont, G.	Mont	5,000,000	200,000	10	*	.....	....	.....	310,000	Jan.	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	.....
12	Breece, S.	Colo.	5,000,000	200,000	25	*	.....	....	.....	2,000	Feb.	1880	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	.....	.....
13	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	140,000	Jan.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.90	.....	.....	.....	13	10	P.
14	California, G. S.	Nev.	54,000,000	540,000	100	638,000	Nov	1882	.20	31,320,000	Dec.	1879	.50	.35	.....	.....	.....	.24	.23	.12	.....	.11	.06	.10	.....	14	7,625	.....
15	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	.....	.....	....	.....	22,850,000	Jan.	1883	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	.....	S.F.
16	Carbon Con., S.	Colo.	1,000,000	100,000	10	*	.....	....	.....	50,000	Mch	1880	.10	.....	.....	.....	.....	.34	.....	.....	.....	.23	.....	.18	.....	16	1,200	.....
17	Carolina Queen, C.	N. C.	200,000	100,000	2	.....	.....	....	.....	8,000	Oct.	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	.....	.....
18	Castle Creek, G.	Idah.	100 000	100,000	1	.....	.....	....	.....	24,000	Jan.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	.....	.....
19	Cataipa, S. L.	Colo.	3,000,000	300,000	10	*	.....	....	.....	210,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	.....	B.
20	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,610,000	Feb.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....
21	Christy, S. L.	Utah	6,000,000	60,000	100	.....	.....	....	.....	78,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21	.....	.....
22	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*	.....	....	.....	1,600,000	Dec.	1881	.50	1.45	1.40	1.40	1.35	1.40	1.35	1.40	.....	1.50	1.40	1.45	.....	22	4,250	B.
23	Climax, S. L.	Colo.	2,000,000	200,000	10	*	.....	....	.....	180,000	Aug.	1880	.80	.08	.....	.08	.....	.08	.....	.....	.....	.....	.....	.....	.....	23	1,900	.....
24	Con Gold Mining, G.	Ga.	500,000	100,000	5	*	.....	....	.....	80,000	Dec.	1882	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	.....	.....
25	Con. Virginia, G. S.	Nev.	54,000,000	540,000	100	897,000	Aug	1882	.30	42,930,000	Aug.	1880	.50	.56	.....	.60	.57	.62	.60	.55	.....	.57	.53	.57	.....	25	7,000	S.F.
26	Contention, S.	Ariz.	12,500,000	250,000	50	.....	.....	....	.....	42,037,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26	.....	.....
27	Copper Queen, C.	Ariz.	2,500,000	250,000	10	*	.....	....	.....	850,000	Jan.	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27	.....	.....
28	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,673,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28	.....	S.F.
29	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*	.....	....	.....	4900,000	Jan.	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29	.....	.....
30	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*	.....	....	.....	200,000	July	1881	07½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	.....	B.
31	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	100,000	May	1876	1.00	4,817,500	July	1882	.25	.....	.....	10.50	.....	.....	.....	.....	.....	9.25	.....	9.50	.....	31	250	S.F.
32	Evening Star, S. L.	Colo.	500,000	50,000	10	*	.....	....	.....	1,225,000	O t.	1882	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	.....	.....
33	Excelsior, G.	Cal.	10,000,000	100,000	100	300,000	Jan.	1882	1.00	875,000	Oct.	1880	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	.....	.....
34	Father de Smet, G.	Dak.	10,000,000	100,000	100	*	.....	....	.....	830,000	Dec.	1882	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	.....	.....
35	Findley, G.	Ga.	2 0,000	200,000	1	*	.....	....	.....	8,000	May	1879	1 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	.....	.....
36	Freeland, S.	Colo	5,000,000	200,000	25	*	.....	....	.....	50,000	May	1880	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36	.....	.....
37	Glass-Pendery, S. L.	Colo.	5,000,000	250,000	20	*	.....	....	.....	25,000	May	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37	.....	.....
38	Gold Stripe, G.	Cal.	1,500,000	150,000	10	*	.....	....	.....	76,000	July	1881	.15	.07	.....	.....	.....	.08	.....	.08	.07	.07	.....	.....	.....	38	1,100	.....
39	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	3,476,000	Sept	1882	.50	3,820,000	Oct.	1870	10 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39	.....	S.F.
40	Grand Prize, S.	Nev.	10,000,000	100,000	100	420,000	Nov	1882	.25	450,000	Sept	1880	.25	.70	.....	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	200	S.F.
41	Great Eastern, G.	Dak.	300,000	300,000	1	*	.....	....	.....	16,000	July	1880	.01	.....	.....	.03	.....	.04	.03	.....	.....	.....	.....	.....	.....	41	1,300	.....
42	Green Mountain, G.	Cal.	1,250,000	125,000	10	*	.....	....	.....	212,000	Nov.	1881	.07½	.65	.....	.70	.65	.67	.65	.64	.....	.60	.....	.70	.68	42	7,200	.....
43	Hale & Norcross, G. S.	Nev.	11,200,000	112,000	100	4,006,000	Sept	1882	50	1,598,000	Apl.	1871	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43	.....	S.F.
44	Hall-Anderson, G.	N. S.	150,000	150,000	1	.....	.....	....	.....	7,000	Jan.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	.....	.....
45	Hecla Con., S.	Mont	1,500,000	30,000	50	.....	.....	....	.....	387,000	Jan	1883	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	.....	.....
46	Hibernia, S. L.	Colo.	7,500,000	300,000	25	*	.....	....	.....	180,000	July	1881	.40	.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	200	.....
47	Holyoke, G.	Idah.	200,000	200,000	1	.....	.....	....	.....	14,000	Jan.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47	.....	.....
48	Homestake, G.	Dak.	10,000,000	100,000	100	200,000	July	1878	1.00	1,812,000	Jan.	1883	.50	16.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	100	.....
49	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*	.....	....	.....	1,700,000	Nov.	1882	.75	7.25	7.00	7.25	7⅛	7⅛	7.25	7.50	7.25	7⅛	7 50	8.25	8.00	49	6,695	.....
50	Hukill, G. S.	Colo.	1,000,000	200,000	5	*	.....	....	.....	210,000	Dec.	1878	.10	.17	.16	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	50	1,400	.....
51	Independence, S.	Nev.	1,000,000	100,000	100	185,000	Feb.	1882	.15	225,000	Sept	1879	.25	.....	.....	.70	.....	.70	.69	.....	.....	.62	.....	.60	.....	51	2,200	S.F.
52	Indian Queen, S.	Nev.	250,000	125,000	2	.....	.....	....	.....	365,000	Nov	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52	.....	B.
53	Inyo, G.	Cal.	500,000	100,000	5	*	.....	....	.....	45,000	Apl.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53	.....	.....
54	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*	.....	....	.....	900,000	Dec	1882	.20	2.90	2.85	2.90	.....	3.00	.....	.....	.....	3.25	3.00	3.00	.....	54	2,120	.....
55	Jocuistitta, S.	Mex.	10,000,000	100,000	100	.....	.....	....	.....	750,000	Nov	1882	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	.....	.....
56	Kentuck	Nev.	3,000,000	30,000	100	342,000	Nov	1881	.30	955,000	Feb.	1870	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56	.....	.....
57	La Plata, S. L.	Colo.	2,000,000	200,000	10	*	.....	....	.....	610,000	Sept	1882	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	.....	.....
58	Leadville, S. L.	Colo.	4,000,000	400,000	10	*	.....	....	.....	270,000	Jan.	1883	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	.....	.....
59	Leeds, S.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	.....	.....
60	Little Chief, S. L.	Colo	10,000,000	200,000	50	*	.....	....	.....	700,000	Aug.	1880	.50	.....	.....	.41	.....	.41	.....	.....	.....	.40	.....	.40	.....	60	1,900	.....
61	Little Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*	.....	....	.....	1,050,000	Mch	1880	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	.....	B.
62	Marguerite, G.	Cal.	500,000	25,000	20	*	.....	....	.....	18,750	Oct..	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	.....	.....
63	Martin White, S.	Nev.	10,000,000	100,000	100	550,000	Sept	1882	.25	90,000	July	1879	.30	.....	.....	.....	.....	.....	.....	.....	.....	.90	.....	1.25	.....	63	200	S.F.
64	Minas Nuevas, S.	Mex.	300,000	100,000	3	*	.....	....	.....	20,000	July	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64	.....	.....
65	Moose, S.	Colo.	2,000,000	200,000	10	*	.....	....	.....	550,000	Mch	1878	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	.....	.....
66	Morning Star, S. L.	Colo.	1,000,000	100,000	10	*	.....	....	.....	565,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	.....	.....
67	Navajo, G. S.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	100,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	5⅛	5.00	5.00	.....	5.00	.....	67	800	S.F.
68	New York & Colo., G.	Colo.	1,250,000	50,000	25	.....	.....	....	.....	25,000	July	1879	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	.....	.....
69	Northern Belle, S.	Nev.	5,000,000	50,000	100	.....	.....	....	.....	2,300,000	Nov	1882	.50	10.00	.....	10.00	.....	.....	.....	10¼	10.00	10.00	.....	.....	.....	69	350	S F.
70	North Bell Isle, S.	Nev.	10,000,000	100,000	100	75,000	Nov	1882	.20	45,000	Sept	1882	.15	.....	.....	.....	.....	.....	.....	.....	.....	.57	.53	.54	.....	70	1,100	...
71	Ontario, S. L.	Utah	15,000,000	150,000	100	.....	.....	....	.....	4,925,000	Jan.	1882	.50	.....	.....	22.00	21.00	22.00	20.00	.....	.....	22⅜	22.00	.....	.....	71	240	.....
72	Ophir, G. S.	Nev.	10,000,000	100,000	100	3,495,000	Dec.	1882	1 00	1,595,000	July	1882	1.00	.....	.....	.....	.....	.....	.....	3.13	3 00	.....	.....	.....	.....	72	200	S.F.
73	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	785,000	Dec.	1882	1 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	.....	B.
74	Pleasant Vall'y, G. S.	Cal.	10,000,000	100,000	100	.....	.....	....	.....	30,000	Dec.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74	.....	.....
75	Plumas, G.	Cal.	1,000,000	100,000	10	*	.....	....	.....	151,000	July	1879	08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	.....
76	Prussian, S.	Colo	1,250,000	125,000	10	.....	.....	....	.....	132,000	Jan	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	.....
77	Quick Silver, pref., Q.	Cal.	4,300,000	43,000	100	.....	.....	....	.....	654,000	July	1882	6.00	.....	.....	.....	.....	41.75	41.50	.....	.....	43.00	42.50	.....	.....	77	500	.....
78	" com., Q.	Cal.	5,700,000	57,000	100	.....	.....	....	.....	151,000	July	1882	.40	.....	.....	.....	.....	8.00	.....	8.50	.....	.....	.....	.....	.....	78	400	.....
79	Quincy, C.	Mich	1,200,000	40,000	25	200,000	Dec.	1862	5.00	3,330,000	Aug.	1882	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79	.....	B.
80	Rising Sun, S.	Dak.	750,000	150,000	5	*	.....	....	.....	52,000	May	1881	07½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	4,200	.....
81	Robinson Bar, G.	Idah.	100,000	100,000	1	*	.....	....	.....	9,000	Dec.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	.....	.....
82	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*	.....	....	.....	575,000	Nov	1881	.50	1.10	1.05	1.05	1.00	1.05	1.00	1.10	.....	1.10	1.05	1.05	1.00	82	21,925	B.
83	Robert E Lee, S. L.	Colo.	250,000,000	500,000	500	.....	.....	....	.....	100,000	Dec.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83	.....	.....
84	Savage, S.	Nev.	11,200,000	112,000	100	5,484,000	Nov	1882	.50	4,480,000	July	1869	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	.....	S.F.
85	Shoshone, G.	Idah.	150,000	150,000	1	.....	.....	....	.....	3,000	Nov	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	.....	.....
86	Sierra Grande, S.	N. M.	10,000,000	400,000	25	.....	.....	....	.....	300,000	Jan.	1883	.25	3.35	3.10	2.70	2.60	2.75	2.65	2.85	2.75	2.90	2.70	2.80	2.75	86	24,925	P.
87	Sierra Nevada, G. S.	Nev.	10,000,000	100,000	100	5,150,000	Dec.	1882	1.00	102,000	Jan.	1871	1.00	3.75	.....	4.00	3.85	4.15	3.90	3.75	.....	3.70	.....	3.90	.....	87	1,600	S.F.
88	Silver King, S.	Ariz.	1,000,000	100,000	100	.....	.....	....	.....	1,125,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	10.75	.....	11.00	.....	11.00	.....	88	540	S.F.
89	Silver King, S.	Colo.	1,000,000	500,000	2	.....	.....	....	.....	50,000	Aug.	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89	.....	.....
90	Socorro, C.	N. M.	250,000	2,500	100	.....	.....	....	.....	4,000	Mch	1882	.00¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	90	.....	.....
91	Spring Valley, G.	Cal.	2,000,000	200,000	1	*	.....	....	.....	50,000	Jan.	1881	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	.....	.....
92	Standard, G. S.	Cal.	10 000,000	100,000	100	.....	.....	....	.....	4,050,000	Jan.	1883	.25	.....	.....	6.50	.....	.....	.....	6.25	.....	6⅛	.....	6 50	.....	92	184	B.
93	Starr-Grove, S.	Nev.	2,000,000	200,000	10	*	.....	....	.....	160,000	Jun.	1881	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	.....	.....
94	Stormont, S.	Utah	200,000	200,000	1	*	.....	....	.....	155,000	Nov	1881	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	.....	.....
95	St. Joseph, L.	Mont	1,000,000	100,000	10	*	.....	....	.....	390,000	Dec.	1882	.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	.....	.....
96	Tip Top, S.	Ariz.	10,000,000	100,000	100	170,000	Mch	1880	.50	100,000	Nov	1881	.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96	.....	.....
97	Tombstone, G. S.	Ariz	12,500,000	500,000	25	*	.....	....	.....	1,250,000	Apl.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	97	.....	P.
98	Vizina, S.	Ariz.	5,000,000	200,000	25	*	.....	....	.....	140,000	Apl.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	98	.....	B.
99	Yellow Jacket, G. S.	Nev.	12,000,000	120,000	100	5,358,000	Feb.	1882	1.00	2,184,000	Aug.	1871	1.50	1⅝	1.50	1.50	.....	1.45	.....	1.50	.....	.....	.....	.....	.....	99	500	S.F.
100	New York Hill, G.	Cal.	5,000,000	50,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	.....
101	Bonanza Developm't Co.		3,000,000	300,000	10	.....	.....	....	.....	135,000	Oct.	1882	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	101	.....	.....
102	Carbonate Hill, S. L.	Colo.	.....	.....	.....	.....	.....	....	.....	.....	Jan.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	102	.....	B.
103	United Gregory, G.	Colo.	300,000	300,000	1	.....	.....	....	.....	26,250	Oct.	1882	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103	.....	.....
104	United Gold Min. Co.	Colo.	.....	.....	.....	.....	.....	....	.....	.....	Oct.	1882	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	104	.....	.....
105	Smuggler, S. L.	Colo.	60,000	60,000	10	.....	.....	....	.....	18,900	Dec.	1882	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	105	.....	.....
106	Gem, S.	Colo.	125,000	125,000	1	.....	.....	....	.....	16,250	Dec.	1882	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	106	.....	.....
107	Glen, S.	Colo.	100,000	100,000	1	.....	.....	....	.....	4,000	Dec.	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	107	.....	.....
108	Granite, S.	Colo.	125,000	125,000	1	.....	.....	....	.....	2,500	Dec.	1882	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	108	.....	.....
109	Grand Central, S.	Ariz.	1,000,000	100,000	10	.....	.....	....	.....	625,000	Dec.	1882	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	109	.....	.....
110	Idaho, G.	Cal.	310,000	3,100	100	.....	.....	....	.....	3,326,250	Dec.	1882	2.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	110	.....	.....
111	Napa, Q.	Cal.	700,000	100,000	7	.....	.....	....	.....	280,000	Jan.	1883	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	111	.....	B.
112	Renfrew, G. S. L.	N. S.	60,000	30,000	2	.....	.....	....	.....	4,800	July	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	112	.....	.....
113	Richmond, S. L.	Nev.	1,350,000	54,000	25	.....	.....	....	.....	3,772,387	Nov	1882	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	113	.....	.....
114	San Francisco, C.	Cal.	.....	50,000	.....	.....	.....	....	.....	22,500	Nov	1882	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	114	.....	.....
115	Sierra Buttes, G.	Cal.	225,000	22,500	10	.....	.....	.

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			†	Highest and Lowest Prices per Share at which Sales were Made. Feb. 24. H.	Feb. 24. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	March 1. H.	March 1. L.	March 2. H.	March 2. L.		Sales.
1	Advance M & M. Co.																						1	
2	Albion, S. L.	Nevada	15,000,000	150,000	100	472,500	January	1883	.50	S. F.											.40		2	100
3	Allouez, C.	Michigan								B.													3	
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	420,000	March	1882	.50	S. F.													4	
5	Alta, S.	Nevada	10,080,000	100,800	100	1,392,090	January	1883	.25	S. F.													5	
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10						.11		.14	.13	.12		.12	.11	.12	.11			6	8,800
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25														7	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*					.19	.18	.19						.19		.18		8	3,400
9	Battle Creek																						9	
10	Bear Creek	California	300,000	300,000	1																		10	
11	Beauce																						11	
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10	S. F.											4.75		12	100
13	Best & Belcher, G. S.	Nevada	10,080,000	1 0,800	100	1,345,790	November	1882	.50	S. F.			.18		.20	.18	.18		.19	.18			13	2,100
14	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*																	14	
15	Black Jack, G.	California	250,000	100,000	2½																		15	
16	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	16	
17	Bondholder	Colorado	500,000	200,000	2½																		17	
18	Boston Con., G.	California	13,000,000	100,000	100	95,000	October	1882	.25														18	
19	Boulder Con.	Colorado									.31	.30											19	300
20	Bradshaw, S.	Arizona	2,250,000	225,000	10						.02										.02		20	1,100
21	Buckeye	Colorado	2,000,000	400,000	5	*																	21	
22	" preferred	Colorado																					22	
23	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	23	
24	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,747,000	October	1882	.50	S. F.									.03				24	100
25	Bye and Bye	Arizona	1,000,000	100,000	10	*																	25	
26	Calaveras, G.	California	500,000	500,000	1	*																	26	
27	Cal. W'r & M. Co., G.	California									1.00												27	100
28	California, B. H., G.	Dakota	10,000,000	100,000	100	480,000	August	1882	.15						.95								28	100
29	Carbonate Hill, S. L.	Colorado	2,000,000	200,000	10					U. Q.													29	
30	Catskill, S.	Nevada	1,500,000	300,000	5												.42	.37	.39		.40		30	2,700
31	Central Arizona, S.	Arizona	10,000,000	100,000	100					B.													31	
32	Chapparal	California									.06				.05		.06						32	3,700
33	Cherokee, G.	California	1,500,000	150,000	10																		33	
34	Chollar, S.	Nevada	11,200,000	112,000	100	465,000	September	1882	.50	S. F.													34	
35	Clarence	Canada																					35	
36	Colorado Central, S.	Colorado	3,000,000	300,000	10																		36	
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50																		37	
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,425,000	January	1882	.10														38	
39	Con. Pacific, G.	California	6,000,000	60,000	100	141,000	August	1882	.25														39	
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*				B.			.03		.02				.03				40	2,100
41	Crowell, G.	North Car.	500,000	500,000	1	*																	41	
42	Dahlonega, G.	Georgia	250,000	250,000	1	*																	42	
43	Dardanelles, G.	California	1,000,000	100,000	10						.11		.11	.09	.10	.09	.10	.07	.08	.07	.07	.06	43	75,600
44	Decatur																						44	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*									.07				.07				45	3,500
46	Durango, G.	Colorado	500,000	500,000	1	*																	46	
47	Eastern Oregon										.11		.12	.11	.11				.10	.09	.10		47	16,100
48	Elko Con., S.	Nevada																					48	
49	Empire, S.	Utah	10,000,000	100,000	100					B.	.56	.54	.55		.53								49	600
50	Enterprise	Colorado																					50	
51	Exchequer	Nevada	10,000,000	100,000	100	630,000	January	1882	.2		2.20		2.20		2.20								51	300
52	Fannie Barret, S.	Colorado																					52	
53	Globe Copper	Arizona																					53	
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*					.05												54	100
55	Goodshaw, G.	California	10,000,000	100,000	100	200,000	October	1882	.10														55	
56	Granville, G.	North Car.	300,000	300,000	1	*							1.15				1.15		1.20				56	3,100
57	Harlem M & M. Co, G.	California								B.													57	
58	Harshaw, S.	Arizona	10,000,000	100,000	100																		58	
59	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20		.12		.12										59	1,400
60	Hortense, S.	Colorado	2,000,000	200,000	10																		60	
61	Index	California																					61	
62	Julia, G. S.	Nevada	11,000,000	110,000	100	1,394,000	January	1882	.20														62	
63	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														63	
64	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																	64	
65	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25										.01				65	100
66	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	66	
67	Mariposa pref., G.	California	5,000,000	50,000	100	1,687,500	December	1881															67	
68	" common, G.	California	10,000,000	100,000	100	1,950,000	February	1882															68	
69	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														69	
70	Mayflower, S.	Colorado	10,000,000	100,000	100	*							3.10				3 13	2.90					70	800
71	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,146,000	October	1882	1.00	S. F.													71	
72	Michoacan Synd.	Mexico																					72	
73	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	73	
74	Miller	Nevada	5,000,000	200,000	25												.25	.20					74	300
75	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20	S. F.													75	
76	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	76	
77	Nevada Syndicate																						77	
78	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10														78	
79	North Horn-Sil., S. L.	Utah		400,000																			79	
80	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00	S. F.													80	
81	Old Dominion, C.	Arizona	20,000,000	200,000	100	*																	81	
82	Orientai	Nevada	2,000,000	200,000	10						.14	.13	.14		.15	.14	.14		.15	.14	.15	.14	82	17,800
83	Oriental & Miller, S.	Nevada	10,000,000	400,000	25																		83	
84	Overman, G. S.	Nevada	11,520,000	115,200	100	3,804,700	May	1882	.25	S. F.													84	
85	Potosi	Nevada	10,200,000	112,000	100	500,640	November	1882	.25	S. F.													85	
86	Quartz Creek				100								.09		.09								86	1,500
87	Rappahannock, G.	Virginia		250,000		*					.08		.08		.07		.08		.08	.07	.08		87	3,100
88	Red Elephant, S.	Colorado	500,000	500,000	1	*																	88	
89	Retort M. & M. Co.	Colorado			10						.57		.57		.57		.50				.50		89	1,000
90	San Pedro, G. S. L.	New Mex.		400,000																			90	
91	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*				B., P.	.40		.40				.41		.43	.42	.43	.42	91	2,000
92	Silver Islet	Canada	1,000,000	40,000	25																		92	
93	Sonora Con.	Mexico									.35		.35		.36	.35	.36	.35	.37	.35	.38	.37	93	103,600
94	South Bodie, G.	California		100,000		100,000	March	1882	.15														94	
95	South Bulwer, G.	California	10,000,000	100,000	100	195,000	May	1881	.25														95	
96	South Hite	California	10,000,000	100,000	100		May	1882	.10														96	
97	South Pacific	California			5								.07		.07		.07		.06		.08	.05	97	12,800
98	State Line, No. 1, S.	Nevada	200,000	200,000	1					B.													98	
99	" No. 2, S.	Nevada	5,000,000	200,000	25																		99	
100	" No. 3, S.	Nevada	5,000,000	200,000	25																		100	
101	" No. 4, S.	Nevada	5,000,000	200,000	25																		101	
102	" Nos. 1 and 4, S.	Nevada			25						.03				.04				.03				102	300
103	" Nos. 2 and 3, S.	Nevada									.07		.07		.07				.07		.07		103	2,200
104	Sutro Tunnel	Nevada		2,000,000		*				B.	.22	.21	.22	.21	.22	.21	.21		.21	.20	.22	.20	104	11,500
105	Taylor-Plumas	California			10					B., P.	.17		.17		.17		.17		.17		.17		105	18,100
106	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10														106	
107	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														107	
108	Unadilla, S.	Colorado	50,000,000	500,000	100	*																	108	
109	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,570,000	January	1883	1.00		4 62	4.50			5.25	5.00	4.75	4 70	5.00	4.50	5 13		109	1,200
110	Utah, S.	Nevada	2,000,000	20,000	100	1,360,000	December	1882	1.00	S. F.													110	
111	Vandewater	Nevada*	20,000,000	200,000	100	*											28						111	1,000
112	Washington	Arizona	2,000,000	200,000	10								.11	.10									112	1,100
113	Whalen Copper	Nevada	2,500,000	100,000	25																		113	
114	Wide West																						114	
115	Willshire	California	250,000	50,000	5	*																	115	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F., San Francisco; B., Boston; P., Philadelphia; and U. Q., Unlisted Quotations, tables.
Non-Dividend shares sold, 393,800, Total shares sold, 447,381.

firm, with a moderate business, selling from $4\frac{1}{2}$@$5\frac{1}{4}$@$4\frac{1}{2}$@$5\frac{1}{8}$. Mexican was quiet and a little weak at $3.13@$2.90. Ophir sold at $3\frac{1}{8}$@$3 with a business of 200 shares. Best & Belcher sold at $4\frac{3}{4}$, with one transaction. Sutro Tunnel was quiet and steady, selling from 20@22c. Yellow Jacket was moderately dealt in at irregular prices, selling from $1\frac{1}{2}$@$1.45@$1\frac{1}{8}$.

The Leadville stocks were quiet and irregular. Amie had an active business at irregular prices, selling from 19@22@21c. Chrysolite was also irregular, under a moderate business, and sold from $1.35@$1.50@$1.45. Hibernia was quoted at 3c. Iron Silver records a moderate business at strong prices, selling from $2.85@$3.25@$3. Little Chief was dealt in to the extent of 1900 shares at 41@40c. Climax sold at 8c. Big Pittsburg was quiet and a little weak at 20@18c.

The Bodie stocks were quiet and strong. Bodie Consolidated sold from $1.40@$1.75, with a business of 950 shares. Standard showed some strength under a small business, and sold from $6\frac{1}{8}$@$6\frac{1}{4}$. Bulwer, with one small transaction, sold at 90c. Goodshaw sold at 5c.

The Tuscarora stocks record but a moderate business at weak prices. Grand Prize was quiet and strong, selling from 70@80c. Argenta records a small business, and was weak; it sold from 50@35c. Belle Isle showed considerable weakness, under a moderate business, selling from 80@50c. Navajo was dealt in to

the extent of 800 shares at $5\frac{1}{8}$@$5. North Belle Isle had a moderate business at irregular prices; it sold from 57@53@54c. Independence declined from 70@60c., under a small business. Elko Consolidated was active and irregular, selling from 12@9@@10c., with a business of 16,100 shares.

In the miscellaneous list, Alice has had a fair business, but has grown weak; it declined from $3.55 @$3, closing at $3.05. Bassick showed considerable strength, with a small business, selling from $8\frac{1}{4}$@ $10\frac{1}{2}$. Eureka Consolidated was quiet and irregular, selling from $10\frac{1}{2}$@$9\frac{1}{4}$@$9\frac{1}{2}$. The Green Mountain stocks were quiet and weak. Gold Stripe sold at 8@7c. Green Mountain declined from 70@60c. and then reacted, and closed to-day at 70c. Rising Sun sold from 7@4c. and Cherokee at 5@6c. Horn-Silver has shown considerable strength, under a fair business; it sold from $7@$8\frac{1}{4}$@$8. Robinson Consolidated has been active and weak; it sold from $1.10@ $1@$1.05. Sierra Grande sold ex dividend this week, and has been very irregular, under a large business; it ranged from $3.35@$2.60@$2.90, closing to-day at $2.75, sales aggregating 24,925 shares. Silver King has been strong with small sales, selling from $10\frac{3}{4}$ @$11.

Alta-Montana records a fair business at steady prices, selling from 11@14@11c. Bradshaw was quiet and steady at 31@30c. Central Arizona records a small business at irregular prices, selling from 42@37 @40c. Decatur has been very active and a little weak; it sold from 11@6@7c., with a business of 75,600 shares. Harlem M. & M. Co. has been quiet and steady, selling from $1.15@$1.20. Oriental & Miller was very actively dealt in, but shows no material change in price; it sold from 13@15c. Rappahannock sold at 9c., with a moderate business. Red Elephant has had a moderate business at steady prices, selling at 7@8c. Silver Cliff has been quiet and steady at 40@43c. Sonora Consolidated records a very active business at strong prices; it sold from 35@38c., the sales aggregating 103,600 shares. South Pacific has been active and weak, selling at 7@5c. The State Line stocks have been quiet; Nos. 1 & 4 sold at 4@3c., and Nos. 2 & 3 at 7c. Taylor-Plumas was steady at 17c. throughout the week, and was actively dealt in at that figure.

The collapse of Gilbert L. Crowell, who was the chief backer of the Empire mine, Park City, Utah, has been a surprise to his friends, although in mining circles his faith in the future of that mine was not shared. It was claimed by those interested in the mine that it was on an extension of the famous Ontario. A mill, which was put up before the condition of the property warranted its erection, burnt down, and there were other troubles which made the development more costly. Utah dispatches state that the mine is in debt to the extent of $65,000, of which $36,000 is due to Utah parties.

According to all appearances, the scheme to consolidate the New York Mining Exchange and the New York Petroleum Exchange has been dropped.

The recent decline in the price of the shares of the Green Mountain Gold Mining Company is owing to the appearance of an advertisement by the sheriff of Plumas County, Cal., in the *Plumas National* newspaper, offering the company's property for sale to pay delinquent taxes; also to the fact that, on account of want of water, the company's three mills, of 92 stamps, have been closed; and also to a demand having been made on the New York office for funds to pay the miners their back wages. The work of running tunnel No. 6 is progressing favorably, and if the company can pull through the next ten months without losing its property, it is believed all will go well, as in that time the Blake chute, it is believed, will be producing rich ore. It is in the power of the stockholders to save this valuable property to themselves, by taking the balance of the unsold bonds, thus furnishing the company with funds to tide over the present emergency.

MEETINGS.

Atlantic Mining Company, No. 76 Wall street, New York. Annual meeting of stockholders and election of trustees, March 13th, at twelve o'clock M.

Conglomerate Mining Company, No. 205 Walnut place, Philadelphia. Annual meeting of stockholders and election of trustees, March 15th, at three o'clock P.M.

Hancock Copper Mining Company, Hancock, Michigan. Annual meeting of stockholders and election of trustees, March 5th, at two o'clock P.M.

Minesota Mining Company, No. 98 Broadway, New York. Annual meeting of stockholders and election of trustees, March 21st, at two o'clock P.M.

Osceola Consolidated Mining Company, No. 69 Devonshire street, Room 15, Boston. Annual meeting of stockholders and election of trustees, March 8th, at twelve o'clock M.

Pewabic Mining Company, No. 19 Congress street (Rooms 11 and 12), Boston. Annual meeting of stock, holders and election of trustees, March 28th, at twelve o'clock M.

Sherbrooke Gold Mining Company, No. 101 Duane street, New York. Annual meeting of stockholders and election of trustees, March 7th, at twelve o'clock M.

United States Ore Milling Company, office of Mr. E. Mygatt, No. 36 Broad street, New York. Annual meeting of stockholders and election of trustees March 8th.

DIVIDENDS.

The Bulwer Consolidated Mining Company, of California, has declared a dividend (No. 16) of five cents per share, payable March 12th at the Farmers' Loan and Trust Company. Transfer-books close March 2d, and reopen March 13th.

The Castle Creek Gold Mining Company, of Idaho, has declared a dividend (No. 10) of three per cent on the capital stock, payable March 16th. Transfer-books close March 10th, and reopen March 17th.

The Charleston, S. C., Mining and Manufacturing Company has declared the usual quarterly dividend of $1.50 per share and an extra dividend of $1 per share on the capital stock, payable on and after March 1st at the company's office in Philadelphia.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 6) on the capital stock, payable March 10th. Transfer-books close on the 3d and reopen on the 12th.

Dividends paid by mining companies during the month of February, and from January 1st, 1883:

NAME OF COMPANY.	Location of mines.	Paid during month of February.	Since January 1, 1883.
Atlantic, c	Mich	$80,000	$80,000
Boston & Montana, G	Mont		10,000
Bulwer Consolidated, G	Cal	5,000	10,000
Calumet & Hecla, c	Mich	500,000	500,000
Carbonate Hill, s	Colo	10,000	20,000
Castle Creek, G	Idaho	3,000	6,000
Central, c	Mich	60,000	60,000
Contention, s	Ariz	62,500	125,000
Con. Gold M. Co. of Ga	Ga	4,000	8,000
Copper Queen, c	Ariz		125,000
Cosmopolitan	Utah		50,000
Deadwood-Terra	Dak		20,000
Father de Smet, G	"	20,000	40,000
Gem, s	Colo		1,250
Glen, s	"		1,000
Granite, s	"		1,000
Hecla, s	Mont		15,000
Holyoke, G	Idaho	4,000	8,000
Homestake, G	Dak	50,000	100,000
Horn Silver, s. L	Utah	300,000	300,000
Idaho, G	Cal	7,750	15,000
Indian Spring Drift	"	1,000	1,000
Jocuistita, s	Mexico	50,000	50,000
Kentuck, s	Nev	3,000	6,000
Leadville Consolidated, s	Colo		20,000
Navajo, G. s	Nev	25,000	50,000
Northern Belle, s	"		25,000
Ontario, s	Utah		75,000
Prussian M. and M. Co., s.L	Colo		15,000
Quincy, c	Mich	240,000	240,000
Richmond, s. L	Nev		135,000
San Francisco, c	Cal		2,500
Shoshone, G	Idaho	1,500	3,000
Sierra Grande, s	New Mex.	100,000	200,000
Silver King, s	Ariz	25,000	50,000
Smuggler	Colo		3,000
Standard Cons., G	Cal	25,000	50,000
		$1,576,750	$2,420,750

G., gold. S., silver. C., copper. L., lead. N. nickel. Q., quicksilver.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum and mining brokers, 55 Broadway, report as follows for the week ended March 2d:

The market has been depressed during the week by the uncertain development of Grandin well No. 5. At the final moment, when it struck sand, the market fluctuated in accordance with the rumored showing, some reports asserting it to be a "gusher," others pronouncing it small and unimportant. The latter has proved true, but the market has been left in a comatose state.

Dullness in oil is almost equivalent to a decline, as carrying charges are constantly running against the holder.

There is more bearish sentiment developing than has existed for some time, based upon the fact that consumption is not outrunning the production as was expected, and that more wells and rigs are in progress than a month ago.

On the "bull" side, it is shown that there has been a decline in the new Forest County wells between January 31st and February 28th of about 700 barrels daily; that the shipments from the oil regions must soon increase, and thus change the present showing of the Pipe Line Company which is an increase of stocks on hand. The enlargement of the constituency of New York petroleum brokers has brought much oil to this city, and into strong hands, who are holding for an advance. This increased absorption of certificates makes a quick and sharp advance probable within the next few weeks. It has been impossible to break it below 97⅝c., and for a dull market it exhibits considerable strength.

The following table gives the quotations and sales at the New York Mining Stock Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 24	$0.98¾	$0.98¾	$0.97⅝	$0.98⅛	268,000
26	.98	1.00	.97¼	.99¾	477,000
27	1.00⅛	1.01⅝	.99½	1 00¾	890,000
28	1.00⅜	1.01⅛	.98⅜	.98⅛	815,000
Mar. 1	.98⅝	.99	.98⅛	.98¼	851,000
2	.98⅜	.98¾	.97¼	.97⅛–¼	628,000
Total sales					3,929,000

SAN FRANCISCO MINING STOCK QUOTATIONS

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 23.	Feb. 24.	Feb. 26.	Feb. 27.	Feb. 28.	Mar. 1.
Albion						
Alpha				1⅛	1	
Alta		11-32	5-16	5-16	5-16	11-32
Bechtel		5-32				
Belcher			7-16	9-16		
Belle Isle		19-32	9-16	½	19-32	½
Best & Belcher		4¼	4⅜	4¼	4¼	4¼
Bodie		2	1⅞	1¾	1½	1⅝
Bullion						
Challar		3-16	3-16	5-32	3-32	3-32
Con. Virginia		9-16	19-32	9-16	9-16	19-32
Crown Point			¾	¾	¾	13-16
Elko Cons		5-32	5-32	5-32	5-32	7-32
Eureka Con			9	9⅛	9½	
Exchequer		3-16	¼	3-16		
Gould & Curry		2⅝	2¾	2⅞	2⅞	2⅝
Grand Prize		11-16	11-16	19-32		7-16
Hale & Norcross		2¾	3⅛	3¼	3¼	3⅛
Independence			21-32	19-32		19-32
Martin White		1¼	37-32	11-16	¾	1
Mexican		2⅞	3	3	3	3¼
Mono		¼	¼	3-16		
Mount Diablo		3½	3½			3½
Navajo		5½	5	5	4⅞	4½
Northern Belle		9¾	10	9¾	9⅝	9¾
North Belle Isle			½	19-32	21-32	19-32
Ophir		3	3⅛	3⅛	3⅛	3¼
Overman						
Potosi		1¼	1⅝	1¼	1¼	1¼
Savage						
Scorpion						
Sierra Nev		3⅞	4	3⅞	3⅝	3¾
Silver King		10		11		10¾
Tip Top						
Union Con		4½	4⅞	4¾	4¾	5⅛
Wales Con		¼	¼	5-16		7-16
Yellow Jacket		1½	1½	1½	1½	1½

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, March 1.

There is absolutely next to nothing doing in copper stocks, the past week being the dullest of this dull season. Calumet & Hecla sold in small lots at $243, but a ten-share lot being placed on the market, caused a drop to $242. Franklin was barely steady at $13, buyer sixty, with regular stock selling at $12⅝. Pewabic was very weak, notwithstanding the report of a rich find in one of the lower levels of the mine; a lot of 600 shares being pressed upon the market, forced the price down to $7½, the last regular sale (21st inst.) being at $9¾. Quincy has been fairly steady at $50, although a lot of 300 shares was sold at $49¾. Osceola was firm but dull, at $31. Allouez sold at $2½, and National at $1½. The aggregate sales for the week foot up only about 2000 shares, which fully indicates the extreme inactivity of the market in this class of securities. The outlook for the future is not very encouraging, there being no disposition with the public to speculate in mining stocks.

In silver stocks, the recent law enacted in Colorado taxing net proceeds of the mines in that State has had a depressing effect on Catalpa and Crescent, two of the most active mining stocks in this market, the former declining from 80@60c. and the latter from

BOSTON MINING STOCKS.

	Feb. 23.		Feb. 24.		Feb. 26.		Feb. 27.		Feb. 28.		March 1.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez					2⅛				2⅛				400
Atlantic													
Aztec													
Best & Bel													
Bodie Con													
Bonanza D					2⅝		2⅝		2¾		2¾		300
Bruns. Ant							15.00						100
Bulwer													
California													
Cal. & Hec			243				242½	242					17
Carbon. Hill													
Catalpa			.72⅛	.70	.67½	.63	.65	.60	62½	.60			2,650
Central Ariz													
Cherryfield									.25				500
Chrysolite													
Con. V'rginia	.53						.56						500
Copp'r Falls													
Crescent			.30	.27½	.28	.25	.25	.24	.27	.24	.30		7,300
Cumberl'd													
Deer Isle													
Denver City													
Douglas	.75				.80	.75	.80	.75	.80	.75			1,100
Duncan													
Dunkin			.27				.30						1,100
Empire	.25	.24	.25		.26	.25	.27	.26	.28	.27			5,500
Eureka Con.													
Franklin			13.00	12¾	12¾	12.50			12¾				270
Gila County													
Hancock G	9.00				9⅛	9.00							300
Harshaw									.75				200
Horn-Silver													
Huron	1⅝				1⅝				1¾				300
Indian Q'n					1.31¼								50
Madison													
Mammoth													
Mass.& N.M	.10	.08	.09		.09	.08	.08	.06	.08				13,575
Milton													
Napa													
National									1⅛				100
North. Belle													
Osceola	31.00						31.00		31.00				21
Penn-Breck													
Pewabic			9.00						7⅛		7⅛		750
Pine Tree													
Plymouth	.23				.24								600
Quincy	49¾		50.00		50.00		50.00		50.00		50.00		195
Ridge													
Robinson													
San Pedro					.75				.57½				325
S'ra Nevada													
S'ra Grande	2.95								2.70				200
Silver Islet											5¼	5.00	150
Silver King													
Simpson Gd	.06		.06		.06								3,100
So. Pacific													
Standard													
State Line													
Nos. 2 & 3													
Sullivan													
Sutro Tun	.22								.21				400
Sycamore													
Twin Lead	.09		.09	.08	.08		.08		.07				5,500
Vizina													

PHILADELPHIA MINING STOCKS.

	Feb. 23.		Feb. 24.		Feb. 26.		Feb. 27.		Feb. 28.		March 1.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American							.25		.25		.27½	.25	28,225
Argent													
Arizona So.													
Aztec													
Battle Mt													
Black Sul													
Bodie													
Buena	.06		.06		.06		.05		.05				20,200
California													
Calista													
Cincinnati	.10		.10				.11		.10		.11		11,600
Comprom'e	.30				.30		.30		.30		.30		13,100
Dauntless							.01						100
Del Monte	.04												3,000
Denver City					.16				.17				6,600
Fairview	.01		.01										10,000
Eureka													
Girard	.17		.18	.17	.20	.19	.22	.20	.21		.20		23,700
Golconda													
Golden Age													
Governor	.09		.09		.09		.09		.09		.10		17,500
Grand Uni'n	.19		.19		.19				.19		.20		19,400
Gunnison							.60	.55					1,000
Hancock													
Iowa Gulch	.10		.10		.10		.10		.10	.09	.10		27,900
King Bul'on													
Ledger Con													
Little Dia'd													
Little Maud					.06				.06				6,600
L'g & D'y Hl							.01						1,000
McCullough													
Magnolia			.01		.02		.01				.02		49,500
Montana													
Mt. Lincoln													
Mt.Sheridan											.04		200
National													
Orion			.06										200
Orion Pref			.12								.10		500
Palmetto E.													
Pembina	.20		.20		.21		.21	.20			.21		12,800
Penn-Breck			.10		.10		.11			.12	.11		11,000
Permanent													
Pizarro													
Pizarro Ex													
Potosi													
Rara Avis			.55						.52½		.52½		2,200
Rara Avis E.	.07		.07		.07		.07		.07		.07		13,900
Record													
Rico Pion'r													
San Pedro													
Sierra G'nde	3.50	3.25	3.50	3.00	3.00	2.60	2.65	2.60	2.75	2.70	2.85	2.80	17,950
Silver Cord													
Silv'r Plume													
Silver Rock													
Sovereign													
Standard													
Sultana	.04		.04		.04						.04		12,600
Sutro Tun'l							.23				.22		600
Tombstone	.75				.80	.77½	.80		.82½		.82½		4,150
Tranquilli'y													
Tyrone													
Victor													
Yale Mt	.07										.10	.09	1,900

30@25c. The rest of the market was entirely neglected.

At the Boston Mining and Stock Exchange, Massachusetts & New Mexico continues to be active at 7@9c. per share. Empire is also in good demand and has advanced from 24@29c. Brunswick Ship's Berth Company, a new stock recently listed, has been quite freely dealt in, and advanced from 40c.@$1.20, with later sales at 90c.@$1. Simpson Gold Company, of North Carolina, which started up again into activity a few weeks ago and sold from 2c. up to 8c., has declined to 4c., with very little doing.

3 P.M.—There was no change in the market this afternoon. Quincy sold at $50. Silver Islet, $5¼@$5. Bonanza, $2¾. Closing prices: Antimony, $14 bid, $15 asked. Bonanza, $2½ bid, $2¾ asked. Catalpa, 60c. bid, 70c. asked. Crescent, 27½c. bid, 35c. asked. Franklin, $12½ bid, $12¾ asked. Harshaw, $1 asked. Huron, $1⅝ asked. National, $1⅛ bid, $1¼ asked. Osceola, $30½ bid, $31 asked. Pewabic, $7¼ bid, $7½ asked. Quincy, $49¾ bid, $50 asked. Silver Islet, $5 bid, $5½ asked. Sullivan, $⅛ bid, $1 asked.

BULLION MARKET.

NEW YORK, Friday Evening, March 2.

The silver market abroad has been firm the past week on steady East India exchanges, but has been lowered here by a decline in sterling exchange.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
Feb. 24	51	110⅞	Feb. 28	51	110¾
26	51	110⅝	Mar. 1	51	110¾
27	51	*	2	51	†

* 110⅞@110¾. † 110⅝@110¾.

United States Mint at Philadelphia.—The coinage executed at the Mint during February amounted to 6,265,440 pieces, valued at $1,100,360. This was composed of 40 double-eagles, 40 eagles, 40 half-eagles, 40 three-dollar gold pieces, 40 quarter-eagles, 1240 gold dollars, 900,000 silver dollars, 610,000 dimes, 2,224,000 five-cent pieces, and 2,530,000 cents.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended March 2d, as compiled from various sources, amounted to $363,463.06, as against $209,130.38 reported for the previous week. The receipts from January 1st, 1883, to date are $2,643,501.11.

BULLION PRODUCTION FOR 1883.

MINES.	States.	For the week.	Month of January.	Year from Jan. 1st, 1883.
Alice, G. S.	Mont		$90,041	
*Alta-Montana, G. L. S.	"		†10.625	
Bodie, G. S.	Cal		26,084	
Bodie Tunnel, G.	"		13,631	
Bonanza King, G.	"		61,777	
*Central Arizona, S.	Ariz		15,627	
*Christy, S.	Utah		23,260	
*Chrysolite, S. L.	Colo		26,312	
Contention, S.	Ariz		88,694	
Crescent, G.	Cal		13,000	
*Custer, G. S.	Idaho		43,572	
*Deadwood-Terra, G.	Dak		45,696	
*Derbec Bl. Grav., G. S.	Cal		8,337	
*Father de Smet, G.	Dak		42,077	
*FriscoM.&S.Co.,G.S.L.	Utah		22,671	
*Homestake, G.	Dak		107,678	
Horn-Silver, S. L.	Utah		203,000	
Lexington, S.	Mont		89,050	
*Little Pittsburg, S. L.	Colo		5,107	
*Marguerite, G.	Cal		10,300	
Martin White, S.	Nev		19,407	
Moulton, G. S.	Mont		41,005	
Navajo, G. S.	Nev		80,000	
Northern Belle, S.	"		65,174	
*Ontario, S. L.	Utah		‡182.221	
*Oxford, G.	N. S.		2,865	
*Satemo, G.	"		1,800	
Standard, G.	Cal		82,959	
Star, S.	Nev		14,796	
Stormont, S.	Utah		19,130	
Syndicate, S.	Cal		9,217	
Tintic M. & M. Co.	Utah		7,632	
*Tip Top, S.	Ariz		7,976	
*Tombstone, G. S.	"		72,011	
Yellow Jacket, S.	Nev		14,252	
Total amount of shipments to date			$1,564,984	

* Official. ‡ Assay value. †Not including value of lead.
G. Gold. S. Silver. L. Lead.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended February 24th	$411,638
Corresponding week last year	1,709,563
Since January 1st, 1883	2,029,892
Corresponding period last year	8,792,740

Imports.

Week ended February 24th	$128,555
Corresponding week last year	75,372
Since January 1st, 1883	894,376
Corresponding period last year	585,633

United States Assay-Office at New York.—Statement of business for the month ended February 28th, 1883:

Deposits of gold:		
Foreign coin	$73,000.00	
Foreign bullion	67,000.00	
United States bullion	500,000.00	
United States bullion (re-deposits)	120,000.00	
Jewelers' bars	78,000.00	
Refined gold	96,000.00—	$934,000.00
Deposits of silver:		
Jewelers' bars	$14,000.00	
Foreign coin	700.00	
Foreign bullion	30,000.00	
United States bullion (contained in gold)	5,500.00	
(Re-deposits)	5,000.00	
Bullion, Arizona	3,800.00	
Colorado	12,000.00	
Lake Superior	800.00	
Montana	60,000.00	
Nevada	10,000.00	
New Mexico	18,000.00	
Utah	103,200.00	
Refined silver	234,000.00—	497,000.00
Total deposits		$1,431,000.00
Gold bars stamped	$2,144,795.00	
Silver "	466,114.00—	$2,610,909.00

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, reduced the minimum rate for discount from 3½ to 3 per cent. During the week, the bank gained £167,000 bullion; but the proportion of its reserve to its liabilities was reduced from 44 1-16 to 43 per cent, against 37 11-16 per cent at this date a year ago. The weekly statement of the Bank of France shows an increase of 1,800,000 francs gold and a decrease of 1,050,000 francs silver.

METALS.

NEW YORK, Friday Evening, March 2.

Copper.—The market again shows signs of being demoralized. Lake has sold as low as 17¾c. in small lots as they came into the market, and on the part of buyers there does not seem to be any eagerness to take what little is offered even at that. For other kinds of copper, we note that large bids have been made for Baltimore, at considerably below 16c., but have been declined.

England cables £65 10s.@£65 15s. for Chili Bars, and £72@£72 5s. for Best Selected. The Chili charters for the first two weeks of February have been exceptionally light.

Tin.—A moderate business has been done, the feeling being better for futures, however, than for spot. Sales during the week aggregate from 250 to 300 tons, the market closing at 20⅞@21c. for Straits.

Lead.—The deadlock here remains unbroken, the only news of any interest, though not affecting the market, being the burning of the St. Joe works. There has not been a single wholesale transaction either in common or corroding lead. We understand that some Richmond lead was offered at 4·55c., but found no takers. It is likely that a few hundred tons, widely distributed, could be placed at 4·50c., which is bid.

Holders are very firm. Those Western smelters who contracted for ores on a falling market, both for lead and for silver, with a slow competition in smelting charges, are not inclined to sell at the loss which present quotations would entail, and appear to prefer to hold on for better prices. On the other hand, manufacturers are fairly well supplied for some time to come.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day :

The market is very steady at some advances on last week's quotations, with a good demand for chemical lead. Sales for the week sum up over 250 tons of Hard lead, at 4·25c., and 200 tons of Refined at the same price.

Spelter.—There is nothing new to report. Common Domestic is quoted 4⅝@4¾c., but it would not be easy to market any considerable quantity at the former price.

Antimony.—The feeling is better. Hallett's is well sold ahead, and is nominally 10@10½c., while Cookson's is firmer, in the absence of the former brand, it being quoted at 11@11½c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 2.

American Pig.—The market is decidedly weaker, and there is some talk about the prices to be fixed for next season's delivery, the time for these contracts being at all events close at hand. It is considered very probable that there will be shading. We quote $23.50@$25 for standard to choice brands of Foundry No. 1 at tide-water, and $21.50@$22.50 for No. 2, Gray Forge remaining at $20@$20.50. Bessemer Pig is dull and unchanged both here and in England, the nominal range at tide-water being $22@$22.50. Nothing has been done in spiegeleisen, which is nominally $26@$27 for 10 to 12 per cent, and $32@$33 for 20 per cent.

Scotch Pig.—Business has been dull, arrivals being 1600 tons, of which 1200 tons have gone into consumption. Freights are unchanged at 6s. 6d. We quote Coltness, $24 75@$25 25 ; Glengarnock, $22@$22.50 ; Langloan, $24.50@$25 ; and Eglinton, $21@$21.50. The Wall Street Exchange has received the following Glasgow quotations by wire to-day : Carnbroe, 55s. 3d. ; Gartsherrie, 61s. 9d. ; Summerlee, 62s. ; Coltness, 64s. 9d. ; Langloan, 64s. 6d. ; Glengarnock, 55s. ; and Eglinton, 49s. 6d. Warrants were 47s. 9d.

Rails.—Business is limited in character. For early delivery, Eastern mills are fairly engaged, and some are delivering orders which go to Western mills and make the latter busier than they have been. We quote here $39@$40 at mill, at St. Louis $45, and at Chicago $42.50.

Old Rails.—These are fairly steady with some sales at $24.25@$24.75 for Ts, and $27@$27.50 for D.Hs.

Scrap.—Very little is doing at $24.75@$25.50 as the nominal range.

It is now probable that a tariff bill will pass. As we go to press, the news is received that the Conference Committee has reached an agreement which fixes the duty on iron ore at 75 cents, the rate on pig iron at $6.72, on steel rails at $17, on steel valued at 4 cents per pound or less, 45 per cent, valued at 7 cents and less than 11 cents, 2¾ cents duty, and above 11 cents value, 3¼ cents per pound. In other items of the metal schedule, so far as learned, the duties are those proposed by the Senate bill.

Philadelphia. March 2.

The iron situation in Pennsylvania has improved slightly. At present writing, the protectionists see a few glimmers of hope, which, if realized, will place them in a better condition than they contemplated a week ago. A growing feeling of the past few days has pointed to the probable postponement of tariff legislation until next winter ; but withcertain modifications of the present metal schedule, a prompt decision would be more acceptable to the greater portion of the iron interests here and throughout the West. Prices have been quite uniform all the week, in view of the adjournment of Congress this week, and the settlement of tariff duties thereby. Several buyers have made their appearance with requirements, which they intend to place next week if prices and delivery suit. No rise in prices is thought probable, but at the same time the possibilities are sufficiently strong to induce some few large consumers of iron and steel to place their requirements for 60 or 90 days to come at this time rather than make further delay, though their action in this respect will be determined largely by the results to be reached between this hour of writing and Saturday noon. There are several encouraging features in the iron market, notwithstanding many discouraging ones. The great factor of railroad construction is assuming a more encouraging aspect. Several hundred miles of road will be undertaken in the North and Northwest in the spring, and completed, if possible, before the coming of cold weather next winter.

Rails.—Makers are confident that, with fair advantages, their mills will be busily employed throughout the year, especially in the East, and at about $40 per ton, though less positive statements can be made of Western mills. A few transactions have taken place this week at a little below $40, and there are offers in hand which makers do not feel justified in accepting at present. There are a good many requirements to be filled, and makers think they will be placed during March, though buyers will hold back to the last hour because of the fact that Eastern mills are filled for months and a good many risks are to be run before contracts can be executed.

Bessemer Pig is without any activity, and quoted at $22.50. Buyers are waiting for better prices, and say they will not pay over $21 at tide-water. A few small lots of Scotch iron sold at bottom figures.

Merchant Bar.—Small lots are selling at about 2·30@2·35c. Stocks are sufficiently large to meet all requirements. Card rates are not easily maintained at mills ; but notwithstanding the decline in prices, manufacturers are not disposed to accept contracts for remote delivery, neither will they place orders for forge iron at $20@$21, though at present cost of production no decline in prices are probable.

Bar-Iron is moving quietly all the way from 2@2·30c., and mill owners are waiting for the disturbing elements to disappear. Skelp-Iron is 2·20@2·40c. Wrought Pipes are 67½@70 off small sizes, and 55 per cent off card list for Boiler Tubes. Several orders are to be placed next week.

Sheet-Iron is moving in small lots, as usual, and consumers are waiting for bottom prices to be reached before placing requirements for supplies for the spring and summer. The output will be absorbed in meeting the spring trade. Stocks are larger than they have been for several months, and there is confidence that the future demand will be large.

Hardware for the spring trade is in improving request, and jobbers from the West and South are placing orders.

Angle Iron is quoted at 2·50c. ; Tees, 3¼c. ; Beams, 3½c. ; Channel Iron, 3¾c. Manufacturers have a few specifications in hand, and will do some business next week for April delivery.

Plate and Tank is in improving demand, though prices will not probably feel the impulse, as books are empty of orders and the volume of the demand is uncertain. Tank Iron is quoted at 2½c., though sold at less. Shell is 3½c. ; Flange, 4½c. ; Fire-Box, 5½c. Manufacturers expect to do a fair business, though they have very little to speak of for several weeks past. As to the probabilities of heavy requirements during this and next month, different opinions have been expressed, but a careful summing up of the situation justifies the opinion that the demand will be no less than last spring, and that prices will not be quite as strong.

Steel Rails are in an uncertain position and are quoted at $39@$40. No large requirements have been placed for several weeks, and there is an accumulating demand which is likely to be put upon the market at any time now that uncertainties as to tariff duties have been virtually removed and railroad companies can figure down cost. There are rumors that contracts will be placed at $38, but they can not be traced to authoritative sources.

Old Rails are weak at $25.50@$26 for Tees quoted, though no sales are mentioned. Sellers of Double-Heads are offering them at $27@$27.50 for shipment to tide-water. Railroad Scrap sold at $28. No. 1 selected from yard sold at $27.50. A few small lots of Scrap sold at $26.

Cleveland. Feb. 27.

[Specially reported by H. S. MOULD & Co.]

The feeling in the iron markets is still one of uncertainty, and is decidedly unsatisfactory, but still has assumed some more encouraging features since our last report. Trade continues in a small way, and consumers only buy from hand to mouth. Stocks of Foundry Irons are exceedingly light, and, should the trade buy in their way, they would quickly exhaust furnace stocks. American Scotch or good soft irons are particularly scarce, and command relatively more than strong irons. The ore trade remains practically at a stand-still. We quote :

No. 1 Bessemer	$23.50@$24.00
" Foundry, all ore	22.50@ 23·50
" Foundry, cinder mixture	22.00@ 23.00
" Soft Foundry	21.50@ 23.00
" Open silvery	21.50@ 22.00
Mill Irons	19 50@ 22.00
No. 1 and 2 Charcoal	26 50@ 27.50
" 3, 4, 5, and 6 Charcoal	27.00@ 28.00
Hanging Rock Charcoal	23.00@ 26.50
Strictly Cold-Blast	28.50@ 31.00
Four months, f. o. b. cars Cleveland :	
Bessemer ores	8.50@ 10.00
Hematite "	6.00@ 8.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 2.

Anthracite.

The anthracite coal trade continues dull, though in some quarters a slight improvement in the demand is reported, particularly so far as steam sizes and pea are concerned. The representatives of the companies have had a number of conferences in relation to the fixing of opening prices for the season. The feeling seemed to prevail that it would not be judicious to take any steps until navigation is opened, and it has been accordingly decided to let things alone until the 1st of April. It is reported that the figures contemplated will be $3.80, $3.90, and $4.35, though the latter one, for stove, is considered too high by some authorities in the trade. It is certainly the policy which the companies are bound to pursue to make these prices as high as they reasonably can, in order to make their contracts covering large periods remunerative. This feeling probably will make them continue the policy of restricting during the rest of the month, and as there will be fifteen idle days, there is little doubt that the market must experience at least a temporary revival. Much is apparently expected from the general resumption of buying to follow the adjournment of Congress, but there are those who very strongly insist that the hopes of the improvement in the manufacturing industries will not be realized. The developments of the next few weeks will be watched with close interest.

Bituminous.

The interest in the bituminous trade still centers in the question of freight rates on the Baltimore & Ohio and Pennsylvania railroads. A few figures will best serve to place the entire matter in the right light. The circular of the Pennsylvania Railroad provides for the following rates, from Clearfield, Snow Shoe, Broad Top, Sonman, etc., per net ton :

To South Amboy	$2.90
To Greenwich, destined to points south of Wilmington and outside the Capes	2.08
To Greenwich, points on river front	2.38
To Philadelphia, city delivery	2.50
To Baltimore, shipment	2.00
To Baltimore, city delivery	2.25

The Baltimore & Ohio rates are as follows to the Locust Point shipping wharves :

From Cumberland	$1 62
" Piedmont	1.83

Basing calculations on these figures, the transportation charges on Cumberland coal alongside New York via Baltimore would be $3.50 ; taking the barge freights the same as last year's contracts, $1.25. Clearfield coal via South Amboy, alongside New York, would have to pay $3.70 for transportation, while it would cost $2.55 f. o. b. Philadelphia and $2.48 f. o. b. Baltimore. Cumberland coal could be brought to Baltimore, f. o. b., via Cumberland, for $2.25 and to Georgetown by canal for $1.95. It will be seen, therefore, that Clearfield coal s at a disadvantage so far as freight rates are concerned to the extent of at least 20 cents. The Clearfield shippers have naturally urged the Pennsylvania Company to give them a fair chance, and it seems that there is a prospect of another conference. Meanwhile, we hear that orders are solicited and obtained in a few instances by both Clearfield and Cumberland shippers, which are inconsistent with the freight rates established, in some cases being so low that there can be absolutely no profit, indicating that the Cumberland shippers who have made the offers in question must look to some other source for a margin. On the other hand, Clearfield shippers have taken low contracts, showing that either they are determined not to lose their grip on the market or that they are willing to impress the railroad company in this way.

For current business, there seems absolutely no inquiry, and we quote nominally $4.50@$4.60 for Clearfield and $4.55@$4.75 for Cumberland coal.

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